MODERN
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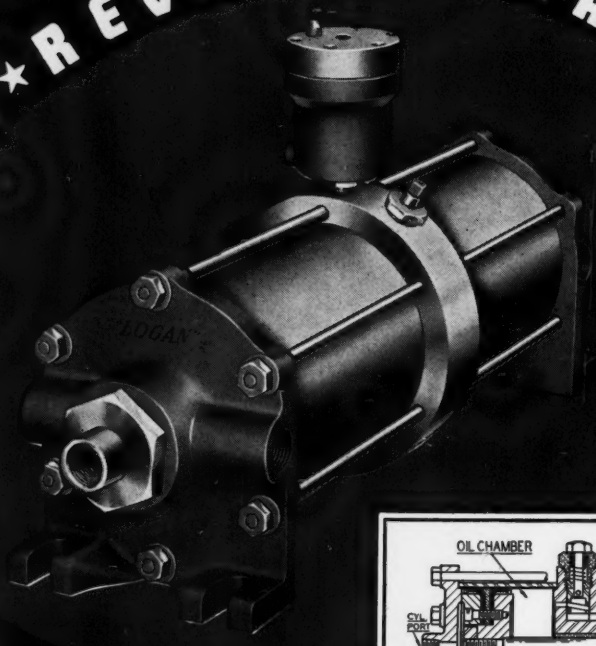


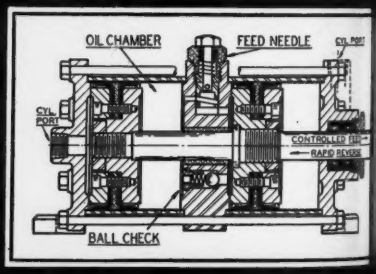
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MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 13 SEPTEMBER, 1940 Number 4

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MODERN
Machine Shop

CINCINNATI, OHIO

SEPTEMBER, 1940 VOL. 13, NO. 4

We Present---

—as our lead article this month a description of one of America's leading gear manufacturing plants. The story doesn't tell very much about the actual cutting of the gears, because gear cutting, as an operation, is pretty much the same the world over. The difference in gears lies in the finish and accuracy —and the accuracy depends pretty largely upon the kind of inspection tools that are used to find out just how accurate the gear is as it comes from the machine and thus what has to be done to make it better. Accordingly, the story is devoted largely to inspection methods and tools.

—the second of James R. Longwell's articles on the use of carbide tools. In this number he talks about the selection of applications, basic carbide tool requirements, and the education of the operators. He also talks about the different kinds of machines and the condition that the machine must be in to produce best results with carbides. This article, though short, is full of good information.

—several pages devoted to pictures of Uncle Sam's machine shops on wheels. Fighting equipment can be manufactured in factories and then sent out in the fields for the troops to use, but when the mechanism of a gun or tank or truck is disturbed, it is practically impossible to send it back to the factory for minor repairs. These mobile machine shops are equipped to take care of the job right in the field. We hope you find it interesting.

—the second article by Lawrence S. Martz on "Microfinish." In this section Mr. Martz talks about the various methods of generating surface quality and presents a number of illustrations showing the difference in the surfaces produced by different kinds of finishing tools. The matter of finish is becoming increasingly important and the data included in this article will be found valuable.

—some unusually good "Ideas From Readers." These "ideas" come to us from executives and mechanics in railroad shops, oil fields, shipbuilding plants, and all other kinds of machine shops, some of them in foreign countries. Here is an opportunity to capitalize on the experience of a great many other men in all kinds of jobs.

—some more time-saving and cost-saving tools in the "New Shop Equipment" section.

Gear Production

. . . By . . .
R. S. MARTHENS
Manager
Westinghouse Gearing Division
Westinghouse Electric & Manufacturing Co.

DUE to the fact that gears provide a positive and accurate means of transmitting power and that with gears the form of this power can be translated into either speed or leverage as the case requires, the importance of gearing in the modern mechanical unit has increased consistently.

In recent years the general trend in gear practice has been toward higher speeds and greater load-carrying capacity for a given volume of metal, and this trend has led to interesting metallurgical and manufacturing problems. Control of raw materials to meet definite specifications, control of heat treating practices, and control of manufacturing tolerances are necessary to meet present-day requirements.

One of the best-known of the modern American gear manufacturing plants is the Nuttall Works of the Westinghouse Electric & Manufacturing Co., located on the banks of the Allegheny River adjacent to the downtown section of Pittsburgh. This plant was established by R. D. Nuttall in 1887 and became a division of the Westinghouse Company in 1929.

One of the manufacturing aisles at the Nuttall Works



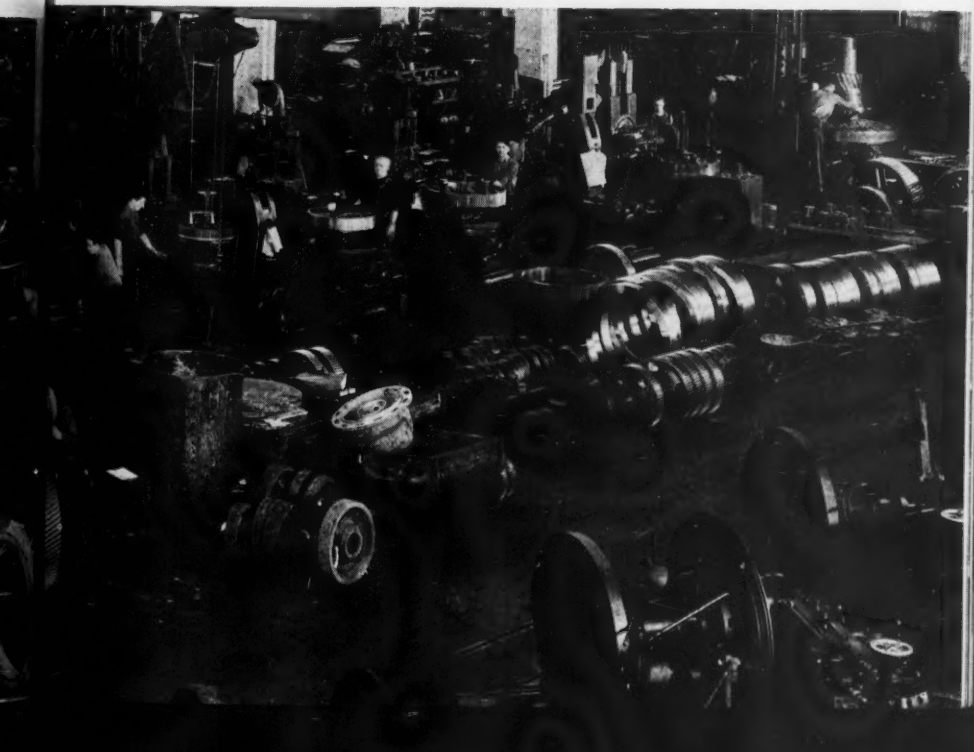
Modern Plant

The plant covers approximately six acres and includes 250,000 sq. ft. of floor space. Of the business handled by this division, approximately one-third consists of gear motors for general industrial applications, one-third consists of separately coupled, enclosed gear drives for industrial and marine applications, both speed reducers and speed increasers, and the balance of the business consists of gearing and current collecting apparatus for the transportation industry.

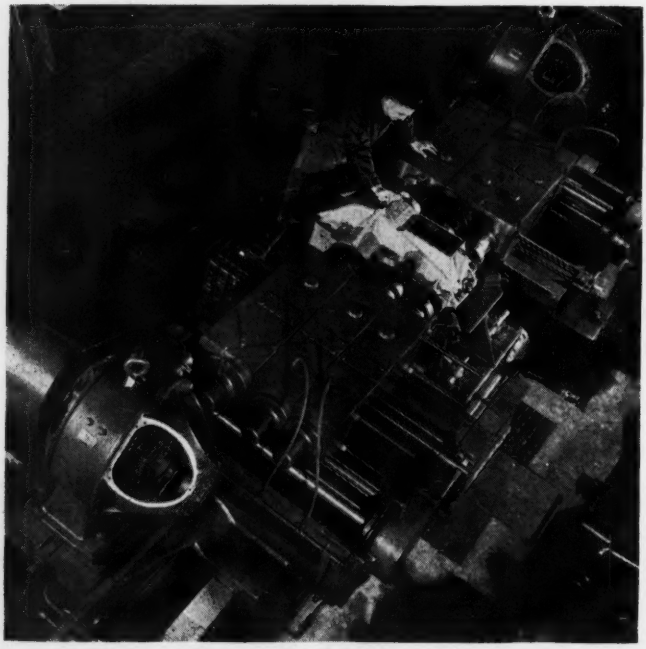
The R. D. Nuttall Company pioneered the use of heat treated gearing for industrial applications and a considerable amount of development work is being continued along this line. The plant has special facilities for doing research work and, in cooperation with the central research laboratories of the Westinghouse Company, many fundamental investigations are being carried on which are of special interest to the gearing industry as a whole.

Manufacturing equipment includes many special machines which have been installed to meet the manufacturing problems arising from customers' specifications. In addition, a special effort has been exerted to obtain or develop, when necessary, testing apparatus and methods by which every dimension of any type of gear can be determined.

The big industrial gears pass through this department.



Control of accuracy is the foundation of the gear-manufacturing business. Year after year industry steps up operating speeds, imposes more severe operating conditions, demands lower noise levels and higher efficiencies in gears, and gear makers must keep pace by means of ever-narrowing standards of precision.

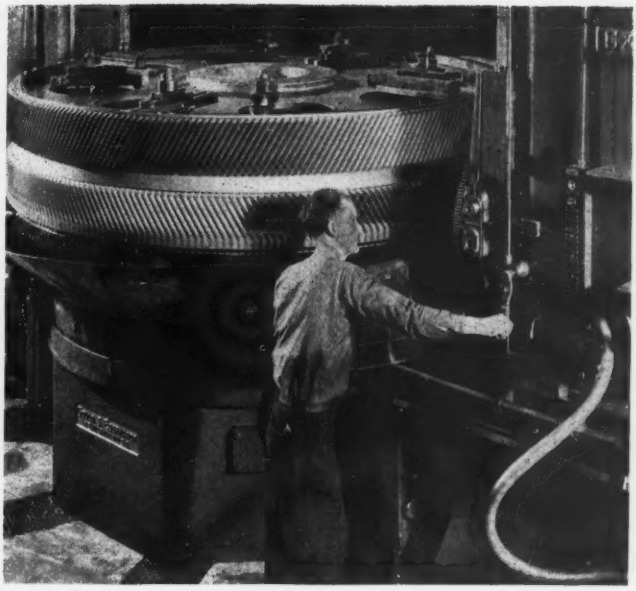


This special six-spindle boring machine is used for boring bearing seats in double-reduction gear cases. Individual spindles are adjustable; center distances are set by means of gage blocks, following which each set of three heads is clamped in position. Center distances and parallelism in both horizontal and vertical planes are held within 0.001 inch.

At the Nuttall Works more than a hundred different accuracy checks of both machines and products are routine parts of production procedure, beginning with rigid inspection of the cutting tools themselves. All new hobs for generating gear teeth are checked in special machines for correctness of gash-to-gash spacing and deviation from a true radial cutting surface, and for lead, profile, and eccentricity of cutting edges. Since a hob, once completely checked, need be checked only for inaccuracies in grinding, a somewhat simpler device is used for routine examination of all hobs after sharpening.

Quietness in high-speed gears such as those used on modern locomotives is attained only by making tooth contours as nearly true involute curves as possible, and these surfaces are checked to limits within 0.0005 inch.

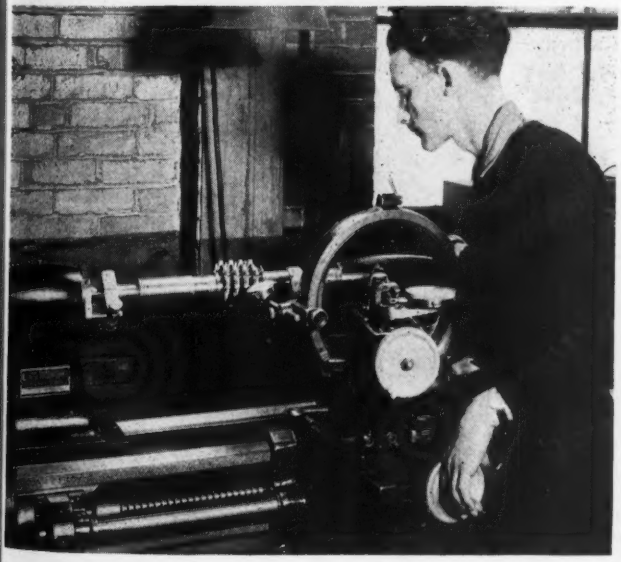
Throughout the plant tolerances of shaft diameters are checked with snap gages, set by means of precision gage blocks and sealed in the tool room so that no change occurs during their use in production. Inspection with such pre-set gages is advantageous because it foregoes much of the element of human error and is independent of cumulative errors in delicate adjustable instruments. The same idea of foolproof inspection is carried out in checking bores and in the manufacture of cases for en-



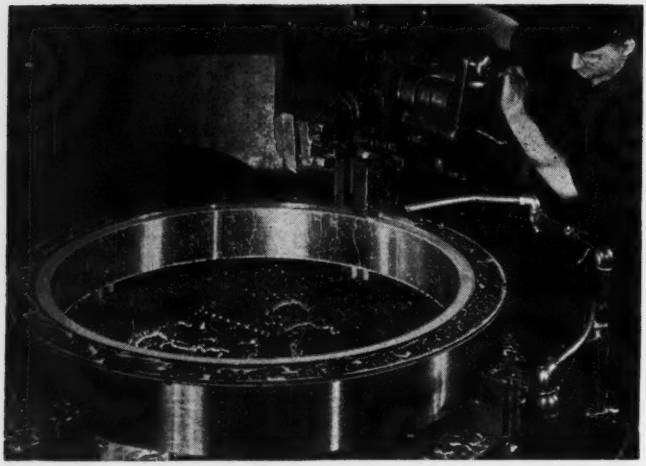
Cutting a 102-in. double helical marine gear for the biggest twin-engine Diesel drive ever built in this country. Rating of the unit will be 8,500 horsepower.

closed gears. Standard "go-no-go" plug gages check bores in gears and pinions, and special chromium-plated spherical gages, accurately lapped, are used for inspecting bearing bores in gear-motor cases.

One of the most important and perplexing problems that confronts the manufacturer of gearing and geared drives for industrial application is the testing of equipment prior to shipment to assure continued troublefree



All new hobs are checked to predetermined tolerances before use. A hob is mounted on an arbor, located between centers of this machine, and a master index plate for the required number of gashes ensures proper indexing for gash spacing. A dial indicator finger checks deviation from correct gash-to-gash spacing and for deviation from a true radial cutting surface. Lead, profile, and eccentricity of cutting edges of hobs are checked in a similar machine.

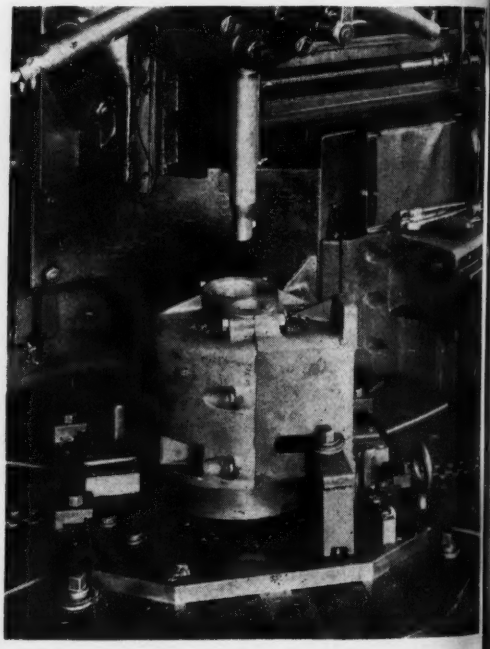


In turning this ring gear the tooling cost with carbide tools were 51 per cent less than with tools previously used.

and satisfactory performance in the field. In this plant great strides have been made in testing through the use of the extensive facilities of the company in accomplishing many of the test set-ups and wherever possible, gearing apparatus is tested under conditions closely approximating conditions of actual service. Products range from pinions less than an inch in diameter, for gear-motors and other small machines, to big double helical marine gears 120 in. in diameter for Diesel drives. Every gear that leaves the plant receives a test, which for simplicity may be placed in one or two categories:

special or routine. Some of the tests considered routine in this plant may not be placed in the same category in other similar plants.

All enclosed drives are given "no load" and "full load" running tests for specified periods, and other generally required tests are run, but specialized testing also is generally

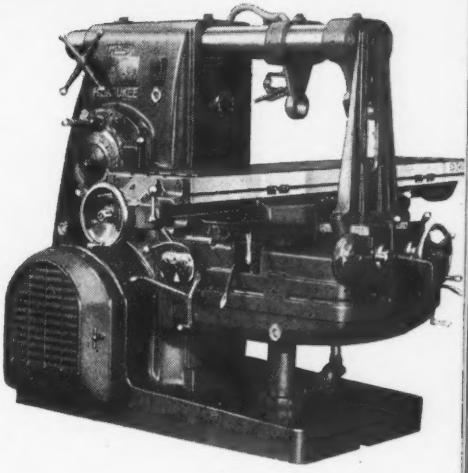


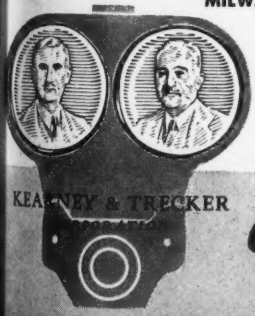
One method of spacing bores in a gear case on a standard boring machine is by means of a fixture like this. The case is shifted from one doweled location to another to determine shaft centers within an accuracy of 0.001 inch.



A LARGE staff of highly trained technical men—constantly checking, testing, and gauging at every stage of construction and assembly — make sure that every part — every unit — measures up to Milwaukee standards of milling machine quality and accuracy.

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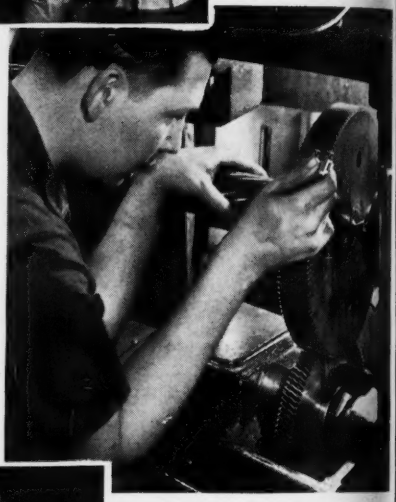




Milwaukee **MILLING MACHINES**



More than 95 per cent of Westinghouse gears are heat treated. Development of the art of heat treating and improvements in cutting tools make it possible to hob carbon-steel gears at a hardness of 311 Brinell and alloy steels at 350 Brinell as routine commercial practice. Some gears, similar to the one shown here, require quenching in more than one bath to harden different parts in different ways.



For gears and pinions used in gearmotors a new method of final finishing, known as shaving, is used. In hobbing, an allowance of from 0.001 to 0.002 in. is made for metal to be removed in the shaving process. Gears are relocated in the machine from shaft centers, as in hobbing. The shaving cutter is a master cutter, circular in shape, with a diameter equal to that of a medium gear and with a face approximately 1¼ in. wide. Teeth of the cutter have about a 10 deg. helix angle and the required tooth form. Across the face of these teeth are a great many serrations which act as cutting edges as the master cutter moves from side to side across the gear teeth. The machine is set for proper tooth depth and face width, after which it is automatic in its operation.

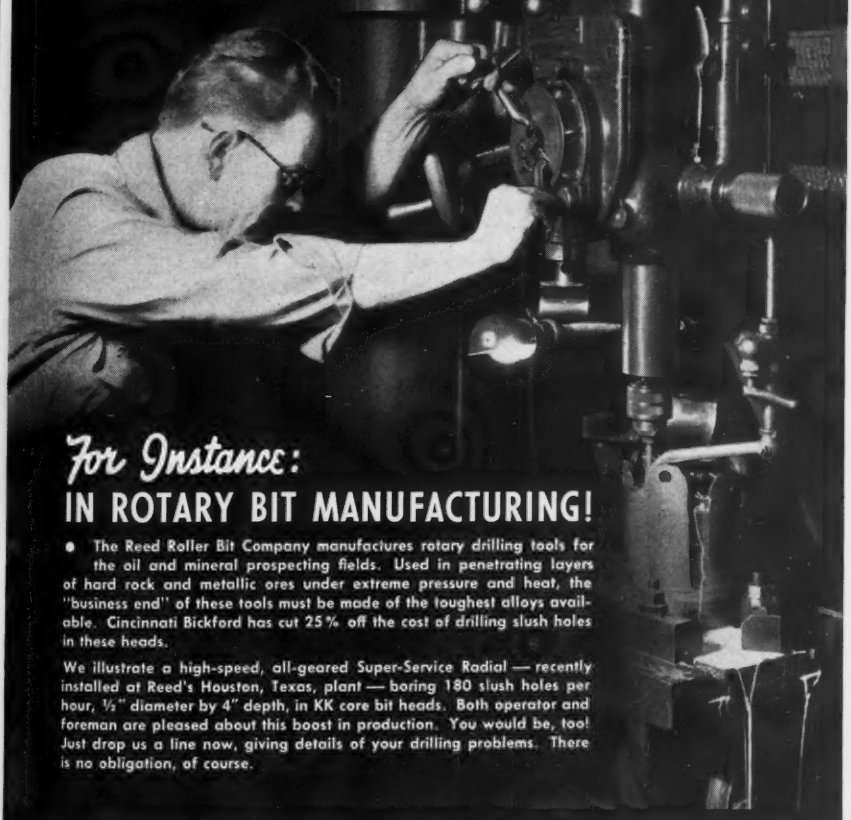


Gears to be mounted on accurately specified centers are run in on this machine. Centers are not read from a scale, but are predetermined by the design engineer, after which a gage block is made with a dimension equal to the required center distance. This gage block, which protrudes from the front of the machine and is being inserted by the operator in this picture, controls center distance within 0.001 in. Gears may then be operated at full speed and their operation checked on correct centers.

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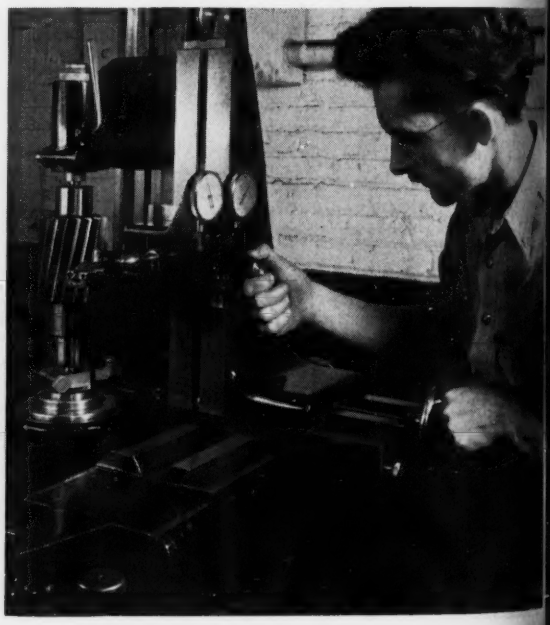
To obtain quietness of operation at high pitch line speeds in a gear like this one for a modern locomotive, tooth contours must be as nearly as possible true involute curves. For detailed checking this unusual Maag instrument is used to measure base or normal pitch at any angle between the base and tip of the tooth. This instrument can check to within 0.00005 inch.

practiced to simulate actual field conditions where possible.

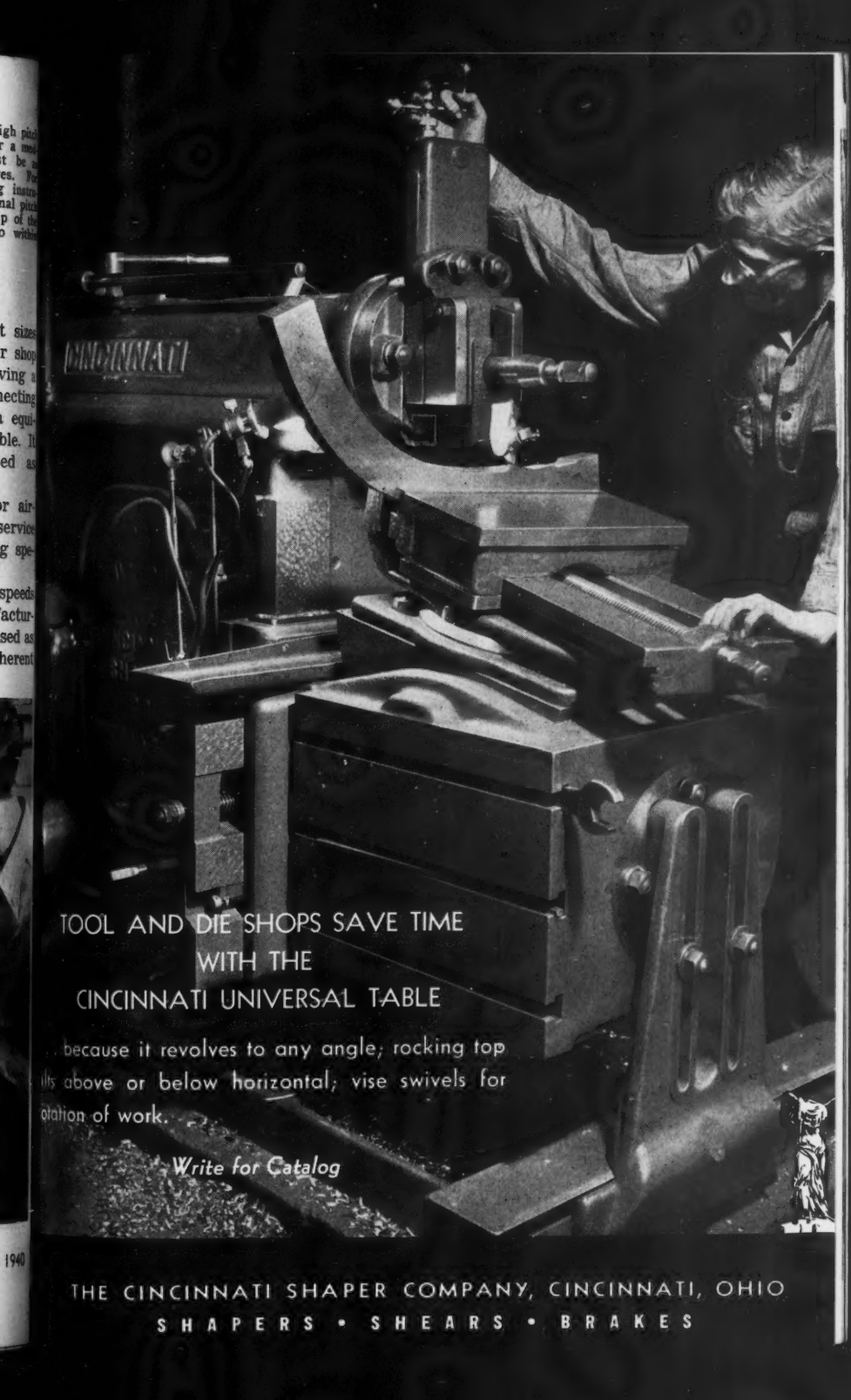
Tests for specialized service include runs under unusual duty cycles; lubrication, temperature, and efficiency runs; and noise level tests. Geared drives for oil-pumping rigs and steel mill round tables are typical of those requiring extraordinary duty-cycle runs. Since pumping rigs vary with individual wells three different sizes of test rigs are maintained for shop testing. A gearmotor for driving a runout table is tested by connecting it to a flywheel having inertia equivalent to that of the runout table. It is then plugged and reversed as though in actual service.

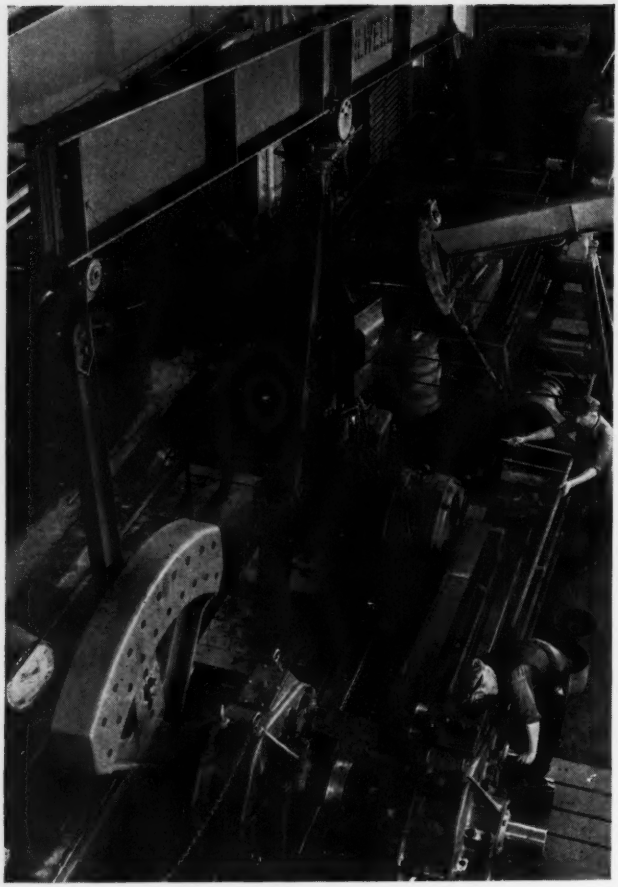
Gears and geared drives for air-conditioning and textile-mill service are examples of those requiring special noise-level tests.

In recent years production speeds have been increased and manufacturing tolerances have been decreased as a result of the advantages inherent



Checking a finished pinion for correct tooth spacing and tooth profile. The pinion is located between centers in the machine,, which contains a three-finger arrangement. One finger is positioned against a given tooth; second finger, spring actuated, provides constant pressure of the pinion against the fixed finger; the third finger actuates the dial indicator, which reads deviation from correct spacing between adjacent teeth. Accuracy is ensured by means of a sine bar whose setting is checked by means of precision gage blocks. For checking tooth profile an indicator finger is placed at the root of the tooth and deviation from a true involute is read at intervals of 0.015 to 0.020 in. until the tip of the tooth is reached. Tolerance for tooth profile error is 0.0002 inch.


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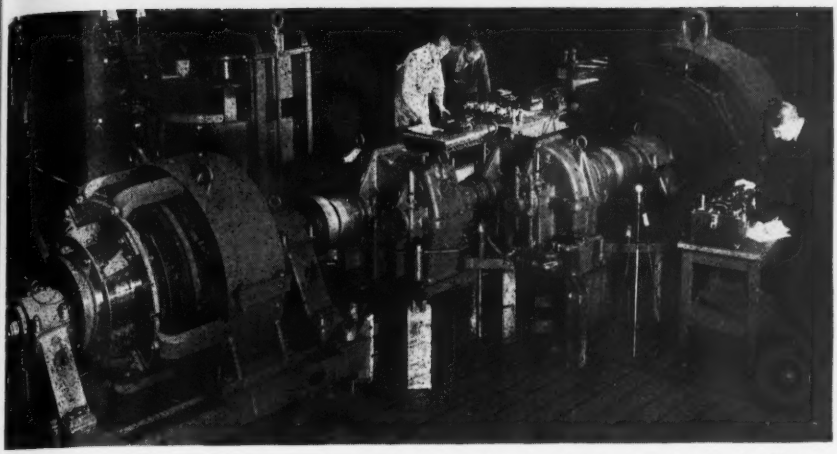


All geared drives for oil-well pumping are subjected to extensive tests on rigs with characteristics approximating actual operating conditions. Three different rigs are maintained for test. The large cast iron weights seen in this picture correspond to the weights of sucker rods; counter balance weights in the crank are omitted so that conditions of maximum unbalance may be simulated.

in the use of carbide tools. A series of case studies made at the Nuttall Works has shown a decided reduction in tooling costs through the use of carbides.

A typical example is a ring gear of 40-50 carbon steel, heat treated to a Brinell hardness of 350, from which 218 cu. ft. of metal are removed in turning. Cutting speed during the studies was 180 ft. per min. at a feed of 0.018 in. per min. Carbide tools were used for turning both outside and inside diameters, as well as the face of the gear. The finish on the turned surfaces was smooth enough to be acceptable under the close tolerances which prevailed and the bore was accurate enough to obviate the usual grinding which had previously been necessary to remove taper. On a comparable basis the costs of turning this gear with tungsten carbide and with tools previously used are as follows:

	Previous Tools	Carbide Tools
Average number rings per tool grind	1/2	3
Cubic inches metal removed for each tool grind	109	1,000
Number of grinds per tool	30	17
Number of rings per tool	15	85
Average cost per tool	$8.00	$24.00
Hours allowed per ring.... Turning	4.90	3.50
Grinding bore	2.70	—
Tool cost per ring	1.06	.53
Tool grinding cost per ring	2.32	.10
Labor cost per ring	4.20	3.05
Total cost per ring	$7.58	$3.68



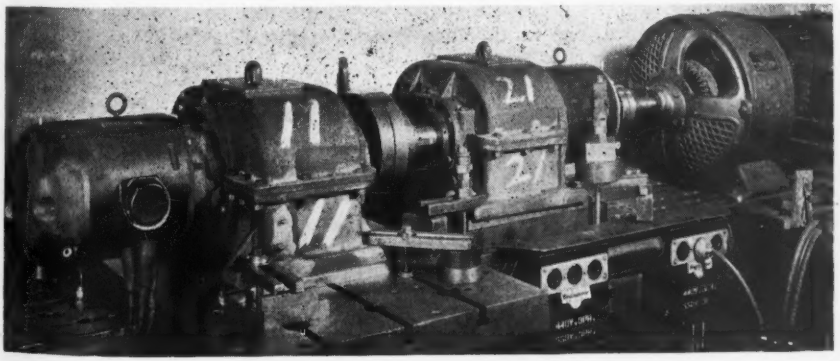
A complex test of lubrication, temperature, efficiency, and noise level under full load. Here a large motor drives the low-speed shaft of a speed increaser, the high-speed shaft of which is coupled to the high-speed shaft of a second speed increaser, which acts as a speed reducer to drive the loading generator at its normal speed.

On this gear, then, the use of carbide tools saved $3.89, or 51 per cent. Similar savings for carbide tools were discovered in other case studies.

In this tabulation tool grinding costs for high-speed steels are included in the number of hours allowed per ring, since the lathe operator dresses his own tools. For carbide tools the grinding cost is allocated separately because tool dressing is performed in the tool room as an operation separate from production.

Cincinnati Shaper Catalog N-1. The Cincinnati Shaper Co., Cincinnati, Ohio, has published a 27-page catalog covering its power rapid traverse, universal, utility, and high speed shapers. Features of the machines discussed include improved automatic flood lubrication, single-point rail clamp and rail elevating and lowering shaft on operator's side of machine, built-in power rapid traverse to table, selective multiple cam feeds, and the Cincinnati universal table. Copy free upon request.

An unusual type of full-load test. A triple-reduction gearmotor under test drives a high-speed generator through another gearmotor used as a speed increaser.



The General-Purpose Use of Carbide Tools, II

(a) Selection of Applications and (b) Basic Carbide Tool Requirements

By JAMES R. LONGWELL
Chief Engineer, Carboloy Company, Inc., Detroit, Mich.

WITH a system of centralized control set up in the shop for broad carbide tool use, as outlined in the previous article (August, 1940, p. 68), the second step towards general purpose use of carbide is to determine broadly the following:

1. General class or classes of work on which to apply carbides.
2. Machine requirements.
3. Extent of operator education necessary.

Determination of the general class or classes of work on which to apply carbides can be made along the following lines:

In ALL shops, general-purpose use should start with operations on which single point tools are employed. Following general applications on this class of work, general use of carbides may be extended to multiple-point cutter applications. Assuming that this procedure is to be followed, the single point tool applications may be broken down into two general classifications; namely, (1) the cutting of steel, and (2) the cutting of cast iron, non-ferrous metals and non-metallics.

In shops having a limited experience with carbides it is probably advisable to apply carbides initially to the machining of cast iron and non-ferrous metals. This procedure is desirable due to the fact that the application of carbides to steel cutting involves a few additional factors.

Assuming that the first objective is to be the general purpose application of single point carbide tools to all possible operations, the general field of use may be broadly determined by consideration of the types of materials to be machined and the machines on which single point carbide tools may be employed satisfactorily.

Materials Machined With Carbides

From the standpoint of materials alone to be machined in your shop, the following guide may be helpful in determining whether or not to apply single point carbide tools.

(a) **Steel:** In general, all S.A.E. forgings and cast steels can be satisfactorily machined with single point carbide tools. On use of carbides for stainless steels, the carbide supplier should be consulted.

(b) **Cast Iron:** Apply generally.

(c) **Malleable Iron:** Apply generally.

(d) **Semi-Steel:** Apply generally.

(e) **Non-Ferrous Metals:** Apply

generally to brass, bronze, aluminum, die castings, copper, and so on.

(f) **Non-Metallics:** Apply generally.

Machines For Carbide Tool Use

Consideration of the machine for carbide tool use includes two factors: The type of machine and the condition.

Suitable Types of Machines

Carboloy tools can be used broadly on most common types of machines in use today. Widest use at present is on engine lathes, turret lathes, automatic chucking machines, boring mills, milling machines and modern types of planers having smooth, continuous drives.

Condition of Machine

Every mechanic knows that the performance of any tool, whether it be steel, alloy or carbide, varies according to the condition of the machine. Carbide tools differ from other tools in that the proportionate results received under ideal conditions are perhaps greater, while, at the other extreme of very unfavorable machine conditions, carbide tools may fail where other tools, due to their greater strength, can manage to struggle through the job.

Many feel that carbide tools cannot be applied to older types of machines or machines that are not in better-than-average condition. It is interesting to note, however, that approximately 65 per cent of all machines in use today are 10 years or more old. Carbide tools are being used successfully on a large percentage of such machines and it is reasonable to say that carbides can be applied on all but the most dilapidated equipment, with, of course, the degree of results varying proportionately with the condition of the equipment.

Horsepower available is perhaps the most important factor in determining whether or not carbides can

Simple Precautions For Operators Using Carbide Tools

Carbide tools are extremely hard and therefore lack the strength of tool steels. They will stand a certain amount of abuse but by observing a few simple precautions, operators should experience little trouble in handling this material.

1. Avoid dropping objects on the tools — especially the tip.



2. Do not tap against carbide tip when setting up.



3. Do not dip carbide tip in any liquid while hot.

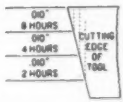


4. Keep overhang of tool to an absolute minimum.



5. Keep tools sharp to prolong tool life and prevent breakage.

(Sketch illustrates how wear increases as tool dulls.)



be used on a given machine. Sufficient horsepower must be delivered at the spindle to operate the job at whatever accelerated rate of speed is decided upon as economical for the job when tooled with carbides. To assist in determining this, bulletins (GT-117 and GT-120) are now available in which a formula for calculating required horsepower under various cutting conditions and all types of metal is provided.

Extent of Operator Education Necessary

Assuming that, as recommended, provision will be made for proper tool grinding and selection of tools, speeds, feeds, and so on, for each job, the problem of educating the operator on the fundamentals of carbide tool use is quite simple one.

It is essential to give the operator general information on the characteristics of carbides. Explain that while cemented carbide is not the extremely delicate material many think it to be and will stand a certain amount of abuse, there are a few things that should be observed in handling this material. Carbides are extremely hard and lack the strength of steel tools. Use normal care in handling. Avoid dropping tools or dropping objects on them. Do not tap against the carbide tip with a hammer when setting up tools. Do not dip tip in any liquid while hot. Keep overhang of tool down to an absolute minimum necessary to clear the work. When coolants are used, provide a generous flow directly to the tool. Avoid stopping in work. Do not run tool until extremely dull. This is uneconomical, as, once the cutting edge dulls, the wear is accelerated as shown on page 79.

With these general points established, the operator should have no difficulty in employing carbide tools satisfactorily.

New Films to Speed Defense Program

A new type of sound motion pictures is expected to provide invaluable aid in the training of the vast army of skilled mechanics and toolmakers that are going to be needed to successfully complete the new national defense program.

These sound motion pictures, containing no entertainment material of any kind, provide simple and practical instruction in all phases of mechanical trades, such as die and tool making, precision measuring and layout methods, machine set-up and operation, and related subjects.

Over a year of research and planning went into the preparation of these films before actual "shooting" started. Full use is made of animated drawings, micro - photography, slow - motion and the many other advantages of motion pictures.

These films are being made in 16mm sound by The Film Productions Company, 1504 Hennepin Ave., Minneapolis, Minn., for use by trade schools, engineering schools and manufacturers. Details upon application.

"How Air Is Being Used in Your Industry" is the title of a 26-page booklet released by the Curtis Pneumatic Machinery Co., St. Louis, Mo., containing a survey of practical applications for Curtis equipment in 45 industries. Among the industries included in the survey are automotive plants, electric light and power plants, forge shops, foundries, metal working shops, rolling mills and blast furnaces, smelting and refining plants, stamping and finishing plants, aviation manufacturers and air fields, coal and metal mines, steam and electric railroads, and so on.

Curtis equipment used in the various industries listed in the survey includes air compressors, air hoists, I-beam trolleys and traveling cranes, air and hydraulic cylinders and air valves, air hose and fittings, paint spray units, hydraulic lift cylinders, and so on. Copy free upon request.



"OUR 67 YALE HAND LIFT TRUCKS COST A TOTAL OF ONLY $5.00 A YEAR TO MAINTAIN," States World Famous Screw Manufacturer

7 cents per truck per year—the customary maintenance fact story with Yale, as testified to by a renowned industrial plant.

They say, "Each unit of Yale equipment placed in service has paid for itself within a short time of purchase. Our 67 trucks cover 16 acres of floor space at a maintenance cost of 7c per year per truck."

You can cut your maintenance costs down to that too. Maybe even less—if your requirements are less rigorous. The local Yale representative has the whole story. Ask him about it.



TRADE YALE MARK

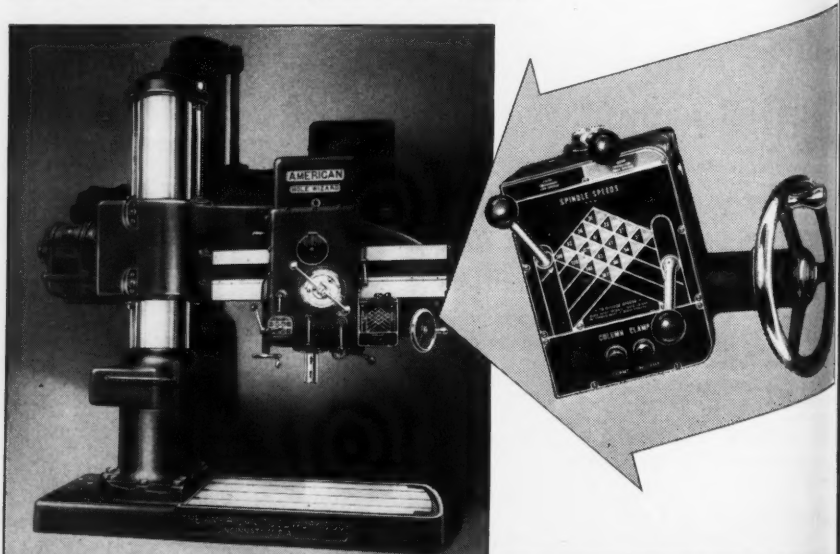
THE YALE & TOWNE MFG. CO.
PHILADELPHIA DIVISION, PHILADELPHIA, PA., U. S. A.
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INSTANTANEOUS SPEED SELECTION . . . . DIRECT READING SPEED PLATE

The amazing simplicity of the new Hole Wizard Speed Changing Unit results in faster operation and lower production costs.

The entire range of 32 spindle speeds is secured in the simplest possible manner by two vertically operating levers which are direct reading, and one two-position back gear lever which is used only when changing from the high to the low-speed range, or vice versa. This speed changing unit is decidedly outstanding in its novelty of design, perfect simplicity and ease of selecting and securing the speed desired.

This is only one of the numerous new and improved features of the new "American" 32-speed Hole Wizard.



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Two Hand Feed
Foot Operated—Two Spindle

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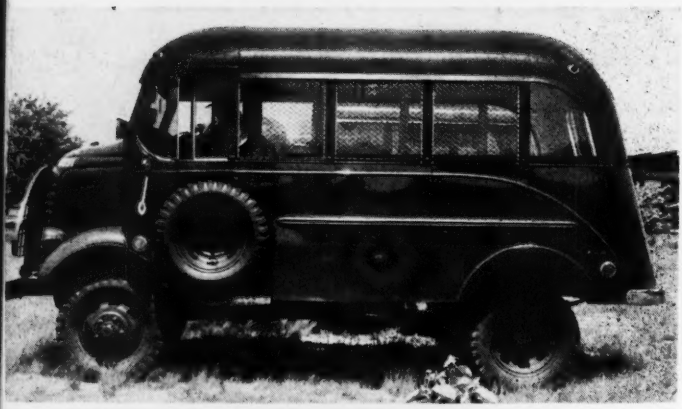
This *new*, standard tapping machine handles parts with one or more holes, *two at a time*, at an average production of 2400 holes per hour.

Work holding fixtures are usually very simple, without guide parts or strippers.

Special tapping heads, up to 12 spindles, for two hand feed, produce up to 12,000 holes per hour.

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Small Arms Repair Tru
This vehicle has the s
chassis as the shop tr
and cargo trucks, and
chassis parts are inter-
changeable.



(Left Center) The tr
arms shop truck opens
the rear, a light-weight l
der being used for entra
and exit. Shown here i
50-cal. automatic tank g
being taken into the tr
for repairs.

Army dn
Mobile chi

(Photos by Rudy Arnold)

AN army is only as effecti
as its equipment, and figh
ing equipment of the mode
type can get out of working c
der as easily as other types
machinery. For fighti
is done in these tim
with machines — l
planes, tanks, machi
guns, anti-aircraft gu
automatic rifles, m
ern artillery, and ot



Interior of Small Arms R
pair Truck. The mechani
working on a 30-cal. m
matic tank gun and a 45-
Thompson submachine g
disassembled, is ready f
repairs. Parts are carried
the kits shown on the b

Here an expert soldier-mechanic is inspecting and reconditioning weapons for the Infantry. The arms in view are a 45 automatic pistol, Springfield rifle, a Garand Model M1 30-cal. semi-automatic rifle, and Browning 30-cal. automatic machine gun.

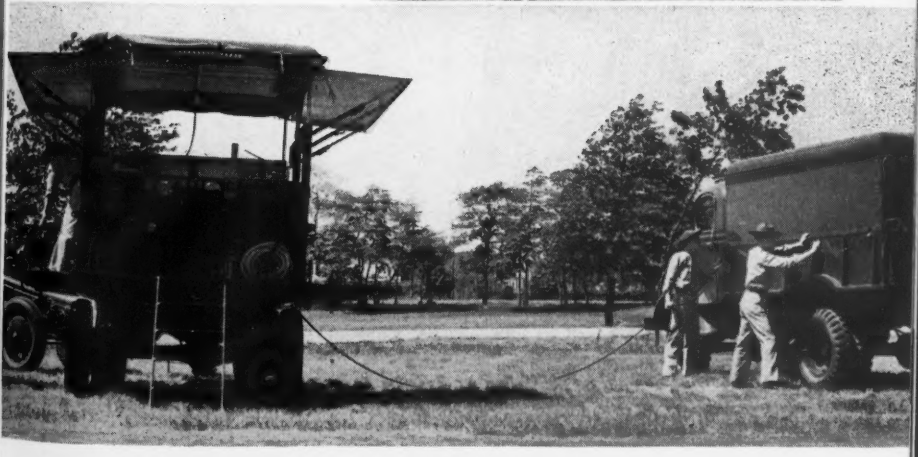


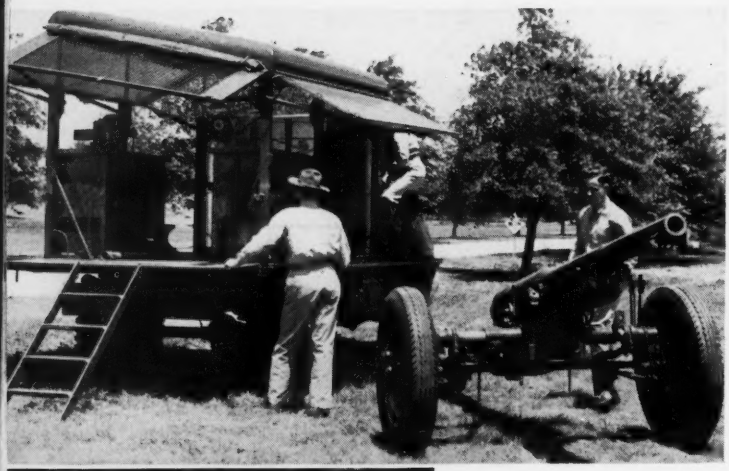
(Right Center) The Small Arms Shop Truck is equipped with a bench grinder, bench drilling machine, and other light equipment.

ny dnance
e chine Shops



(Below) Each truck is equipped with a 5 kw. a.c. generator for the production of current to operate the machines and tools. With one generator operating, current can be transmitted to adjacent shop trucks.





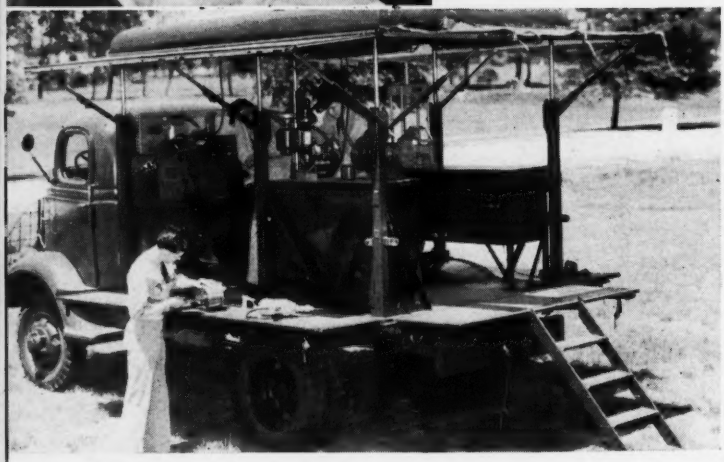
When a shop truck is to be used, the top is raised by means of a hydraulic hand pump. This photograph shows a top partly raised, one side being raised at a time.



(Left Center) An outside control box on each shop truck makes it possible to hook up the electrical connections without opening the truck. The control box is also designed so that power can be brought in from a commercial source if necessary.

products of the machine age, dependent upon the efficient operation of intricate mechanisms for their effectiveness.

The Ordnance Department of the United States Army is not only responsible for procuring the fighting equipment, but also for keeping that equipment in good working order. Time and expense can be saved and the supply of effective ordnance in the field can be augmented if repairs can be made in the field instead of having to send the equipment back to the shops. To meet this need the Ordnance Department is now equipping the various units with mobile machine shops such as those shown



Machine shop truck set up for operation with soldier-mechanics at work.



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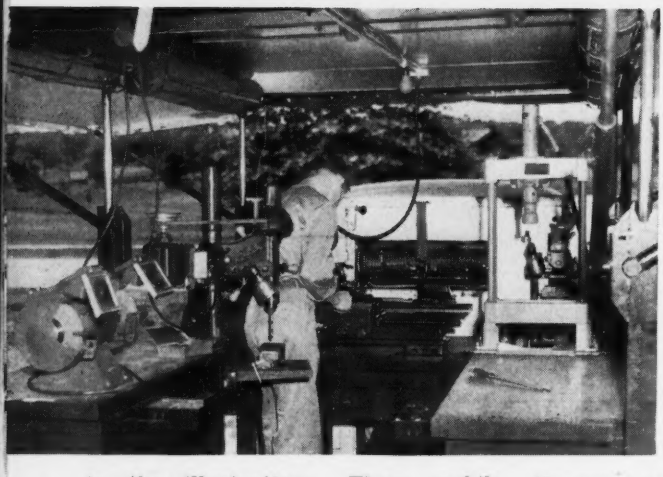
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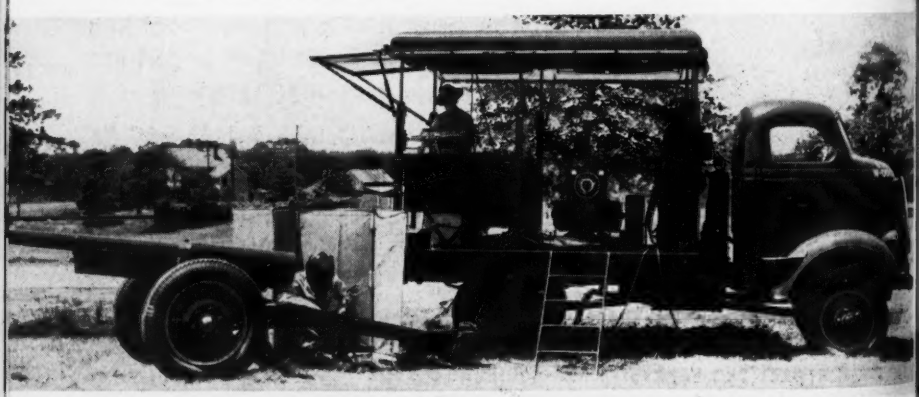


Close-Up View of Interior of Machine Shop Truck showing Bench Grinder, Bench Drill Press, Engine Lathe, Shaper, and Hydraulic Press and Substantial Benches with Drawers for Small Tools and Equipment

in the illustrations. These mobile "shops" are trucks with special bodies designed to house machine shop equipment, automotive maintenance equipment, welding equipment, spare parts, and so on. The number of vehicles required for each organization varies according to the type and quantity of material used and maintained by that organization. For instance, one or more small arms trucks are all that would be required for maintenance of ordnance weapons and materials supplied to the Air Corps Squadrons. In other cases, such as an ordnance company attached to a mechanized cavalry outfit, a fairly complete set of vehicles would be required, ranging from the spare parts truck and cargo truck to three or more shop trucks. The shop trucks would probably be one machine shop truck, a welding shop truck, automotive shop truck, and tank maintenance truck.

The chassis of shop trucks are identical throughout, all parts being interchangeable. Any body can be used on any chassis, the only difference in the trucks being in the equipment. However, some of the bodies are completely enclosed, with heavily-

Welding Truck set up for operation. The truck is equipped with a 200 amp., 50 V. welding generator, which is considered adequate for all field welding operations, also complete acetylene welding outfit, portable grinder, welding screen, and other hand and power tools.



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Holo-Krome FIBRO FORGED Socket Screws are the results of a New and Superior method of manufacturing developed, patented and exclusively utilized by Holo-Krome.

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Chrome Nickel Alloy Steel, to our specifications, scientifically heat treated to develop the utmost in strength and fatigue resistance.

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Socket Screws

After Quality, Strength and Unfailing Performance have been tested and proven, to "Standardize on Holo-Krome" is the only profitable conclusion . . . Socket Screw Users ARE Standardizing on Holo-Krome in ever increasing numbers—there is a reason . . .

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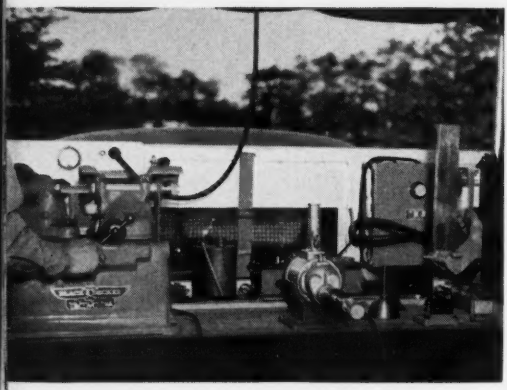
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Interior of Automotive Repair Truck, showing Valve Grinding Machine, Portable Drill in Bench Stand, and Various Types of Testing Equipment. All kinds of repairs can be made on automotive equipment in the field.

screened windows on the sides; some have metal roofs and sides, and some are canvas-covered. Those with the canvas tops are used for cargo, spare parts, and artillery repairs; the others contain the shop equipment.

Where metal sides are used, the side divides at the center with both upper and lower halves being hinged so that they can be swung out at right angles to the roof and floor. Thus the upper halves double the width of the top, affording extra shade and weather-protection, and the bottom halves serve as work benches. When the weather is too bad to allow working in the open, the sides are left open and canvas curtains are used for protection.

These curtains can also be unfastened at the bottoms and stretched out tent-fashion from the roof or attached to poles or trees to provide shelter from the sun or rain.

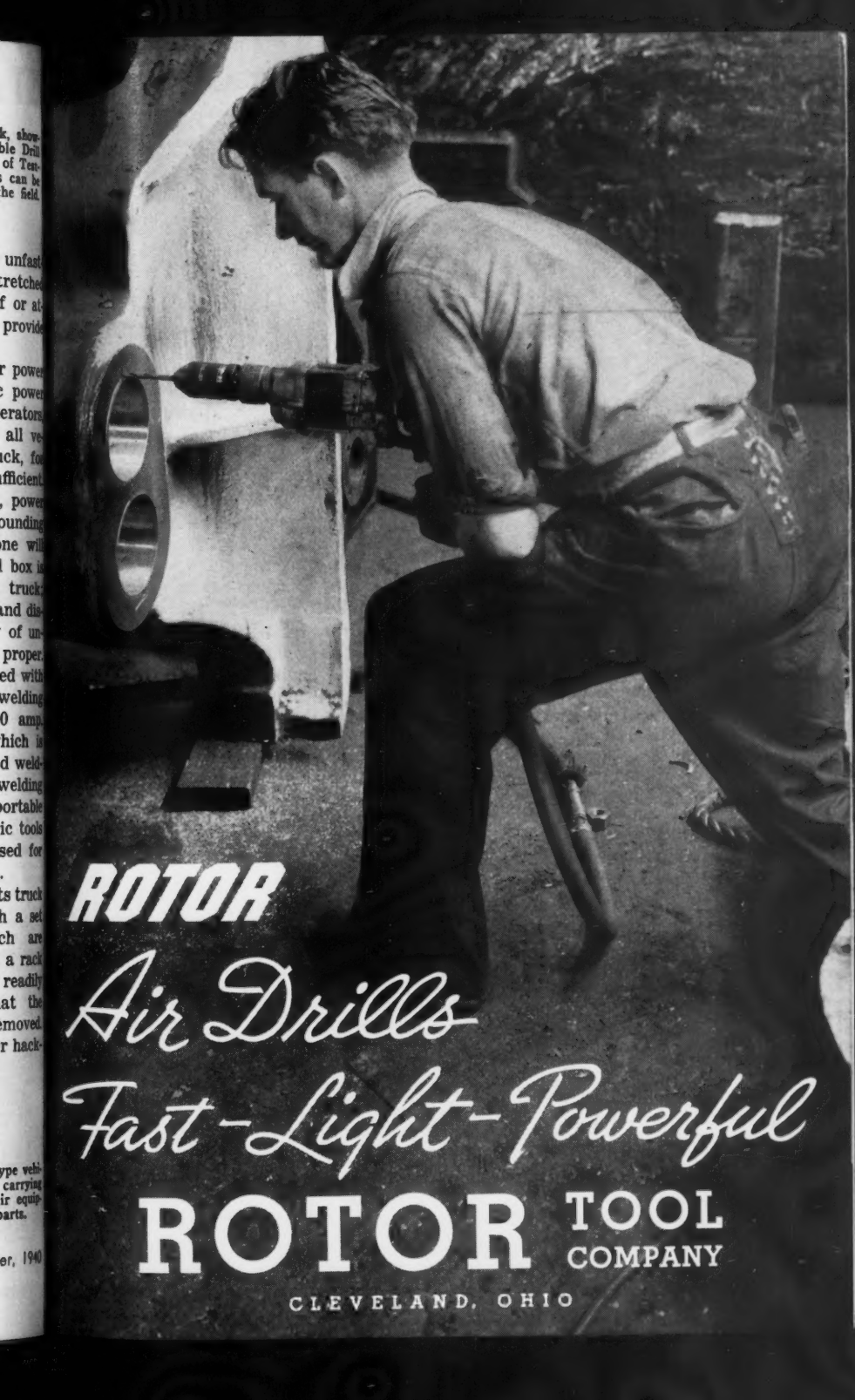
The machine tools and other power tools are operated by electric power generated by 5 kw. a.c. generators, one of which is included on all vehicles except the welding truck, for which a 1 kw. generator is sufficient. With one generator operating, power can be transmitted to surrounding vehicles and in most cases one will be enough. The power control box is located on the outside of the truck; thus power can be generated and distributed without the necessity of unlocking and opening the truck proper.

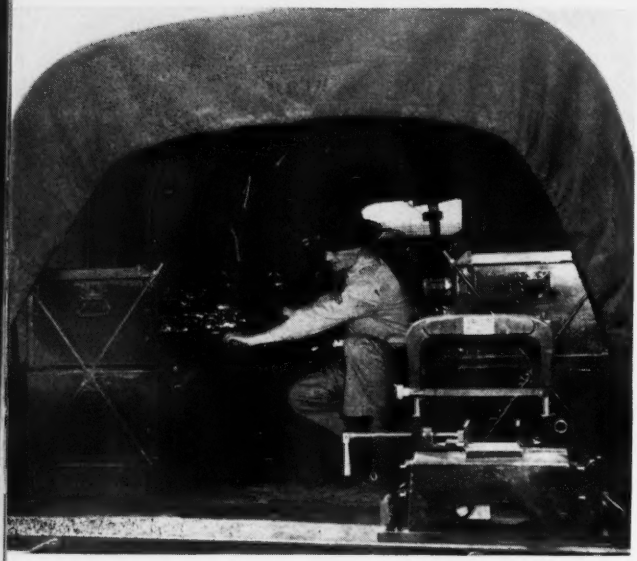
The welding truck is equipped with a complete set of acetylene welding and cutting equipment, a 200 amp. 50 volt welding generator which is considered adequate for all field welding operations, a portable welding screen, portable grinder, portable drill, and other portable electric tools of the type that would be used for ordinary welding repair work.

The spare parts truck is equipped with a set of chests which are held in place by a rack device that is readily removed so that the chest can be removed. A portable power hack-



Side view of cargo-type vehicle, which may be carrying cargo, artillery repair equipment, or spare parts.


ROTOR
Air Drills
Fast-Light-Powerful
ROTOR TOOL COMPANY
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Interior of cargo-type truck being used as a spare parts truck. The chests are held in place by a rack that is readily removable, allowing the chests to be removed if necessary. A portable electric hacksaw of the type shown here is supplied to each maintenance company.

saw is also provided for each maintenance company. The saw has a capacity of 5 x 5 in., yet can be carried by one man. The entire complement of equipment can be dismounted in approximately an hour, making the vehicle available for cargo or other purposes.

The automotive maintenance truck has a complete set of equipment for grinding valves, testing valve springs, power reaming, testing and straightening connecting rods, emergency filling of tires, and so on. In the machine shop truck will be found a screw-cutting lathe, bench drill press, small shaper, bench grinder, hydraulic press, and complete set of small tools for hand and machine operation.

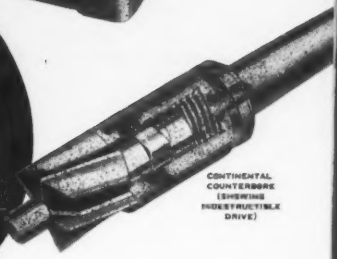


Cargo-type vehicle being used as an artillery repair truck, carrying special artillery repair parts, tools and equipment for maintenance of artillery, individually or in conjunction with machine shop trucks.

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Microfinish---What It Is and How It Is Used, II

. . . . By . . . .
LAWRENCE S. MARTZ
Advertising Manager,
Micromatic Hone Corporation

In this, the second section of the article, the author discusses the various methods of generating surface quality

SURFACE quality is determined by, or results from, several combinations of factors including: metallurgical properties, the manner in which the surface is generated, and the manner in which it is to be used in operation. To a very large extent it is dependent upon the manner in which stock is removed by shearing action in machining processes.

From an abstract point of view, a remarkable degree of surface quality is obtained from the majority of conventional machining operations under favorable operating conditions. Such critical factors as the relative unit weight of assembled machine parts, the machine foundation, inertia, vibration, and centrifugal forces are minimized to a remarkable degree if not wholly eliminated. The result produced by precision boring and grinding equipment, as related to improved spindle bearings alone, is a wonderful mechanical achievement.

The hone abrading method of processing is singularly fortunate in its relative freedom from these critical factors of machine balance. The result obtained by honing is relatively independent of the operation of the machine, for the following reasons:

The entire control of pressure application is designed into the tool adjustment mechanism. Universal joints in the tool provide compensation for minor misalignment of the spindle and work, and eliminate high spindle bearing maintenance costs. All abrading elements are solidly supported by the tool construction, and the tool is supported concentrically in the bore by the work itself. This construction assures balanced shearing force application and eliminates the possibility of structural deformations due to quill or spindle bearing limitations.

Shearing action in any amount, however great or small, requires the application of pressure combined with motion. Shear is produced fundamentally by stressing material beyond its rupture point. In doing this work some adjacent material is usually stressed beyond its yield point, forming a region of structural deformation which impairs the efficiency of the boundary surface. Successive machining operations, while removing all or part of this deformed material, generate more regions of similar new deformations. The extent of stressing below the boundary limit of

* Presented before the Machinability Group, Cincinnati Chapter, American Society for Metals, and reported exclusively for MODERN MACHINE SHOP.

fracture is particularly noticeable in some moving picture, photoelastic studies of cutting action which have been made by Dr. Hans Ernst.

By localizing the influence of these stresses through reduction of high unit stress on a large number of cutter tips, it is possible to remove evenly any desired amount of stock from surfaces of any degree of roughness, as shown in Fig. 9. This profilogram represents a bored surface over which a honing tool has been passed for two strokes. The approximation of the plane generating action, suggested by the accompanying sketch, to the actual profile record of controlled shearing action is readily apparent.

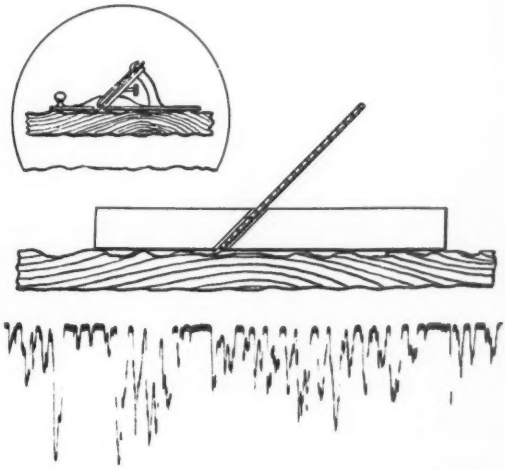


Fig. 9—Profilogram of Bored Surface Over which a Honing Tool Has Been Passed for Two Strokes.

Smooth surface finishes which will secure the advantages indicated in the foregoing analysis of surface quality are usually produced by any of several abrading processes including grinding, lapping, superfinishing and microfinish honing.

A comparison of surfaces obtained both with and without conformity to proven practice is presented in Fig. 10. All photomicrographs shown are 200X magnifications. The photomicrograph on the extreme left illustrates a widely publicized "mirror finish," obtained by bonded abrasive wheels in an application on tapered roller bearing races. The writer questions the quality of surface smoothness, although it did permit a beautiful reflection of checkerboard squares in the advertisements.

A lapped surface, representative of that used on a well known make of gauge blocks, is shown in the center picture. In considering the cutting marks which show on this surface, it should be remembered that two of the gauge blocks may easily be wrung together, indicating their essential surface flatness, the high percentage of contact bearing area, and that the depth of the cutting marks is extremely shallow.

A microfinish honed surface is shown in the right hand picture. The regularity of the direction of cutting marks is due, of course, to the method of mechanical application. This type of generated finish is conventionally called "crosshatched." It will be noted that this application produces cutting marks of no greater depth than those obtained by lapping, and that it generates at least an approximately equivalent percentage of flat bearing area.

Because of loose terminology which has been used in referring to various abrading processes, we will analyze, briefly, the fundamental differences in application which distinguish these processes. With the exception of

whether bonded or loose abrasive is used, they differ chiefly in their applications of pressure, motion, and operating speed. These differences produce important variations in the degree of accomplishment obtained.

Grinding

In cylindrical and surface grinding applications, an abrading wheel of relatively narrow width is used under a relatively small total pressure which may be decreased to the point of "sparking out" in the final finishing passes. As the wheel is traversed slowly over the work, or vice versa, a uniform directional abrasive travel path is generated in the form of a helix of extremely fine pitch.

The cutting action obtained in grinding is accomplished by means of high speed rotation of the wheel, at recommended speeds ranging from 2,000 to 10,000 surface feet per minute. This is from 20 to 100 times the speed used in honing. The work may be held stationary, or rotated at very low speed, preferably in the opposite direction of wheel travel.

In this actuation, each individual abrasive grain is plunged into the work under tremendous impact. It serves to accomplish stock removal with the force of a veritable bombardment, or "explosion." While the total pressure load between the wheel and the work may be comparatively small, the force per unit area of contact may be much higher than is used in any other abrading or machining process.

This plunging, explosive, impact action, combined with so-called one-point or line contact application of the wheel, produces tremendous localized heat and stress concentration. Cutting action is subject to intermittent deflections of the spindle and similar bearing operating limitations and to a variable depth of influence. For instance, if total horsepower input can be considered to represent the total heat generated, then grinding generated from 2300 to 9500 times as much heat per individual grit as would a comparative honing application.

The process can be operated in such a manner as to accomplish everything that can be done by abrading, including finishes which will read as low as 1 to 2 microinches, r.m.s., according to Profilometer reading.

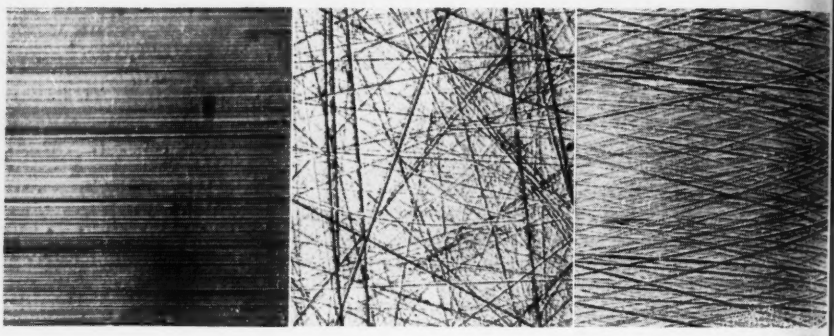


Fig. 10—Comparison of Surfaces Finished by Usual Methods. Magnification, 200X. Left—"Mirror Finish" Obtained by Bonded Abrasive Wheels. Center—Lapped Surface. Right—Microfinish Honed Surface.





● **Record-breaking cutting rates, so dramatically exemplified in this actual case study*, are but one of the things which are turning shop after shop to the Atkins Curled Chip System of Metal Cutting. For these unprecedented rates, accomplished through faster speeds and heavier feeds, are accompanied by other equally important production benefits.**

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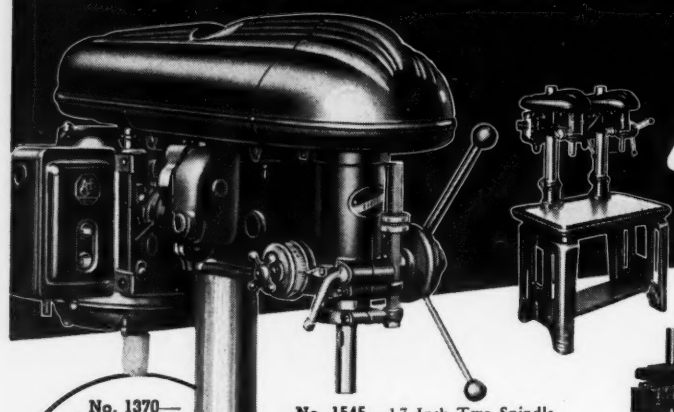
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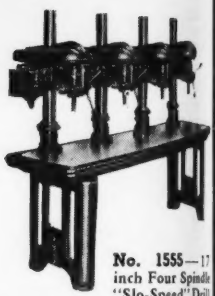
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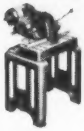
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Lapping

Lapping consists of the use of loose grain abrasive flours mixed with oil or similar fluid. The abrasive is applied by means of lapping shoes, quills, or similar units, which are made of softer metal than the work to be lapped. Cutting action is accomplished only by abrasive particles which become charged, or embedded, in the soft metal lap. Total pressure application may be relatively low, and yet cause high unit stress per individual grit, depending on the number, location, or degree to which the grits are embedded. Conventional actuating motion comprises combined rotation and stroking of the lapping member over the work surface in multi-directional abrasive travel, at relatively low speed and under relatively low total pressure.

The process is capable of generating surface planes accurate within a few millionths of an inch, and surface smoothness of less than one ten-millionths of an inch. Stock removal, however, is relatively uncontrolled and therefore very low and limited, production is extremely low, accuracy is largely dependent upon the skill of the operator, and lapping is essentially confined to steel parts. It can produce a very high percentage of flat surface area, as in Johansson gauge blocks, but is relatively too expensive for production requirements.

Superfinishing

The essential principles of the superfinishing development restrict it to the use of extremely low pressure application by bonded abrasive members, in a multi-directional abrasive travel path, and to extremely low speed actuation.

In comparison with other abrading methods, its cutting action and influence is said to be limited to approximately 0.0001 in. of stock. It does not correct dimensional error, or generate accuracy of form, except within range of the above amount of stock removal.

The maximum contribution of superfinish is claimed in the generation of low tolerance planar surface smoothness. Accomplishment in present installations for processing brake drums, valve stems, valve tappet heads, flywheel faces, crankshaft and cam shaft bearings range from 1 to 11 microinches, r.m.s., or the equivalent of from 4 to 44 microinches of total height of roughness.

Microfinish Honing

If past experience is dependable, then it is virtually meaningless to consider surface accuracy separately from size and form accuracy, or from surface quality as related to essential requirements for maximum operating efficiency. It may be recalled that the process of machining now called "honing" originated from a simple "de-fuzzing" operation in engine cylinder bores, using a crude form of hand-operated lapping device with loose abrasive. The use of this method and equipment was confined strictly to the automotive reconditioning field.

The urgent need for increased accuracy of bores then prompted the development of a tool using several bonded abrasive sticks, which was called a "cylinder grinder." It was not until these tools demonstrated ability to correct error and generate bore accuracies of from 0.001 to 0.0015 in. for roundness and straightness that they received serious consideration by production engineers. Thus accuracy of form was the *first* production requirement.

Next came the demand for accuracy of uniform sizing, to meet the important requirement for interchangeability of parts. Accordingly,

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suitable controls were developed whereby the expansion of the abrasive members used in the honing process could be limited. These two requirements, combined with all the ramifications of processing variables in production, created the third requisite for increased control of stock removal under any or all conditions, and to meet demand for increased standards of accomplishment.

by further improving actuating a justment controls in the tools and b stimulating the extension of abrasi manufacturing into definite grad tions of the abrasive flours. It th pioneered in developing new abradi actuations to produce what w called "mirror finish," and which w quickly adopted by industry. Sin 1932 honing has been generating su face smoothness within 1.5 to 5 m

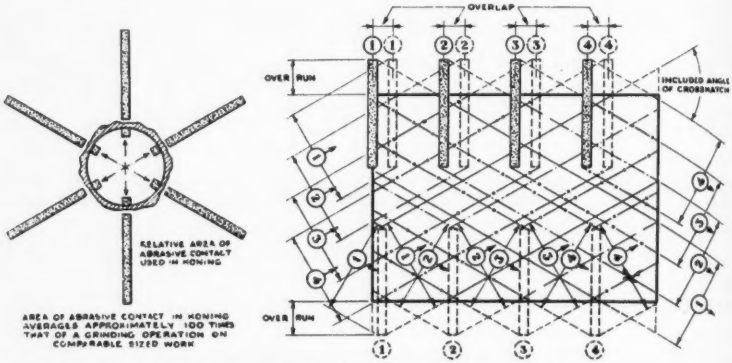


Fig. 11—Diagram Illustrating Construction of Conventional Honing Tool and Showing Path of Stone Travel.

In consequence, honing development has increased its rate of stock removal from 1200 to 1400 per cent. It frequently corrects distortion errors of 0.015 to 0.018 in. following heat treating. It generates accuracy for roundness and straightness as low as 0.0001 in. to 0.0002 in. in many high production parts. This was accomplished by incorporating practically all actuating controls within the tools, and making the tools virtually independent of all but major inaccuracies in machine spindle operation.

As mechanical development in all branches of manufacturing progressed toward increased operating efficiency, the need for reducing operating frictional wear created a demand for improved surface quality. The honing process met this fourth requirement

croinches, r.m.s., in many steel an cast iron parts, and from 3 to 7 mi croinches, r.m.s., in cast iron engin cylinder blocks in high production.

Honing is fundamentally a wet cut ting process. In its present stage o development various methods of con trolled, mechanical application o bonded abrasive in large area contac with the work are used, under ex tremely low unit pressure, multi-di rectional travel of the abrasive, unde relatively low speed surface travel. I does not conventionally general alignment as related to squarenes concentricity, or parallelism of axe in adjacent bores.

Honing employs a multitude o "cutter tips" or bonded abrasiv grains in simultaneous contact wit the work. These abrasive cutter tip

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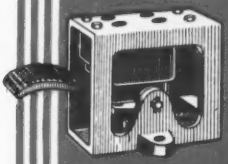
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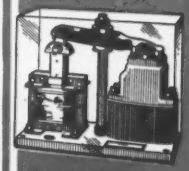
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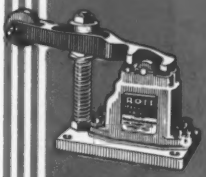
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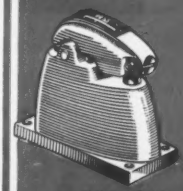
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are crystalline and subject to fracture, though they are the hardest material manufactured in industry. They are formed into "sticks" and bonded together by vitreous bond posts, which also are fracturable, and are manufactured in a wide range of grit sizes, shapes, structure, hardness of bond, and so on.

In the construction of the conventional honing tool a number of sticks are employed, of such sizes as may be determined by construction limitations according to the diameter of the work. The area of abrasive contact thus provided in honing will range from approximately 140 to 350 times as much as in a corresponding grinding application; and honing will have from 2100 to 36,000 times as many simultaneous shearing contacts.

With so many shearing contacts, sufficient pressure application and low speed motion is required to accomplish and maintain penetration of the grains. The sticks are arranged in such manner as to assure even pressure distribution, the abrasive is evenly suported against the work, and the tool is self-centered in the bore.

This arrangement of a large number of shearing contacts permits low unit stress application over a large area of the work surface. It assures uniform depth of shearing influence and eliminates the generation of injurious frictional heat. Stock removal by free-cutting action is obtained by keeping the abrasive contact areas clean. This is accomplished by allowing for a uniform rate of fracture of the individual grains and of the bond posts, thus maintaining sharp cutting edges at all times during operation.

Uniformly-controlled cutting depth of the bonded grains is obtained by multi-directional travel of the abrasive, in various numbers and com-



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binations of annular rotations and axial reciprocations. Where desirable, the work may also be rotated or reciprocated, or both. These combined actuations serve to provide a universal force actuation on all individual grits, regardless of the angle of their travel, if conceived as a thin metal shaving, would be as shown in the lower right hand corner of the picture. You will note that in practically every bore the stick will not return to its original starting position but will successively overlap its previous position at the end of each stroke. The crossing of these paths on the forward and reverse strokes forms the "crosshatch" which is characteristic of this actuation.

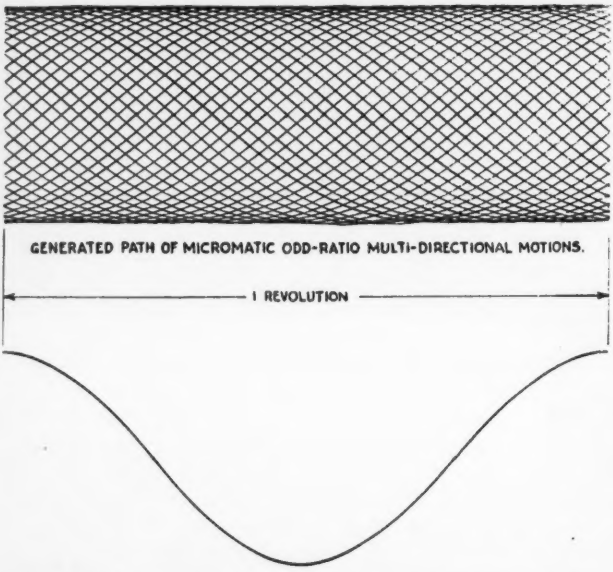


Fig. 12—(Top) Typical Graph of Coverage of Work Surface Area by a Single Grit in Honing. (Bottom) Graph Showing Coverage of a Single Grit under Evenly Divisible Ratio of Mechanical Motions. This Grit Path will Repeat Itself Indefinitely.

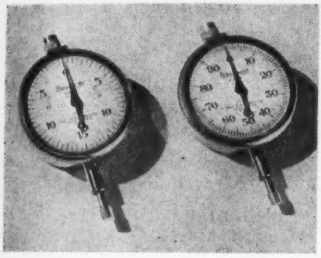
The paths of a number of sticks, positioned at spaced intervals around the periphery of the hone, will cross each other many times during operation, as shown in simplified form in Fig. 11. With a wide range of selection in establishing the angle of crosshatch in these traversing paths, and with a uniform rate of abrasive fracture, it is virtually impossible for a grit to cut a continuous spiral or to follow in any of its former paths—a necessary requirement for uniform abrading effort.

cleavage planes to the work, and also on all bond posts, which accomplishes a uniform rate of grain and bond fracture.

The simplest form of multi-directional actuation used in conventional applications combines a simple rotational with a simultaneous reversing stroke, or traverse, of the tool in generating a simple harmonic abrasive travel path. The ratio is slightly more than two revolutions to one reciprocation. The path of the stone

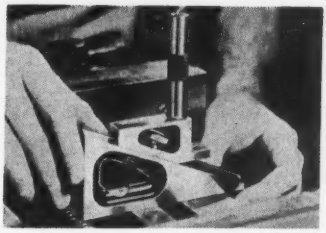
Uniform abrading effort is, in part, the amount of coverage of work surface by each abrasive grain under uneven ratio actuation, as illustrated in Fig. 12. The top graph is typical of the coverage of work surface area by a single grit in honing actuation. It is the equivalent in mechanical motion of one rotational and two reciprocational motions, all working si-

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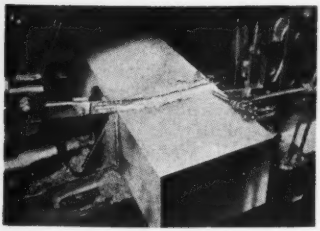
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multaneously.

These combinations of odd-ratio motions are practically unlimited. They can be selectively arranged for any degree or type of finish desired. This type of actuation is of major importance in producing more rapid stock removal, increased stone life, and planer surface accuracy.

The bottom graph shows the coverage of a single grit under unit, or evenly divisible ratio of mechanical motions. This grit path will repeat itself indefinitely.

Accuracy for final dimensional size in honing is accomplished by regulation of the expansion of the abrasive, which is usually done by having the expansion mechanism feed out to an adjustable limit stop provided in the tool.

Accuracy for diametric roundness is obtained by the rotary motion of the hone, and the freedom of the tool to center itself with the neutral axis of the bore.

Accuracy for diametric straightness is produced by the reciprocation, or reversing traverse, combined with positive expansion and equalized pressure application throughout the length of the stones and the working stroke. This readily permits the correction of error for taper.

Accuracy for axial straightness is accomplished by the use of sufficiently long stones to overcome any axial deformity in the bore. Stone leng is established in relation to bo length to assure uniform abradi effort or coverage of the work su face. This requires that the lon tudinal travel path, generated by posite ends of the stones at the en of the stroke, shall not overlap.

The production of any desired d gree of planar surface accuracy controlled by adjustment of the cu ting action of the abrasive. This m be accomplished in several ways, of which comprise the reduction penetration of the grits. Where t coolest, free-cutting action is des able, it is customary to reduce t pressure while either slightly redu ing the speed, or while maintaini the same speed. By using this met od, the cutting action may be so co trolled that the viscosity of the co ant or lubricant may support t abrasive.

Pressure application in honing controlled either mechanically or h draulically. With the hand-brake-ty of mechanical adjustment it is pos ble to maintain a correct pressu cycle; that is, starting with low pr sure, increasing to higher pressu and ending with diminishing or n out pressure. This accomplishme however, is almost entirely depe ent upon the skill of the operator.

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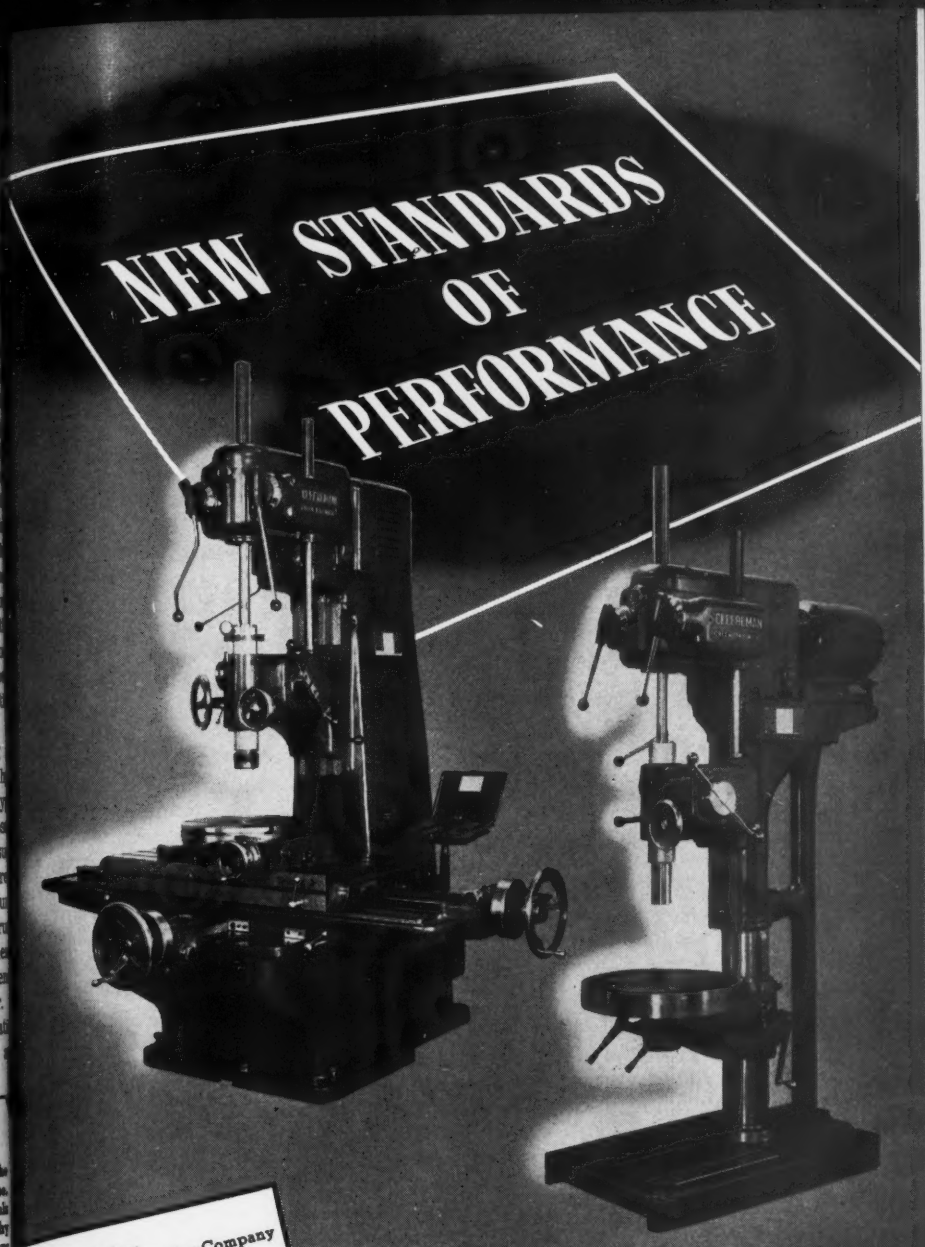
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plied by means of a caged spring provide more consistent control of pressure application, and consequently more uniform production and results as related to accuracy and finish. Spring pressure inherently loses its force as the spring elongates, thereby decreasing unit pressure during the

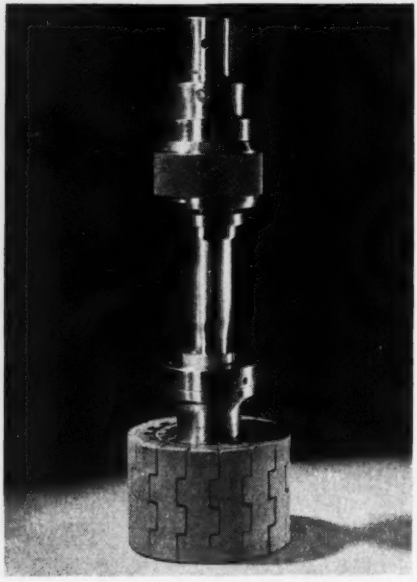


Fig. 13—Honing Tool in Which Interlocking Stones are Used, Presenting Complete Annular Abrasive Contact at All Times During Operation.

work cycle. This fact limits economical stock removal, but the tool is entirely satisfactory for finish honing where diminishing pressure is advantageous.

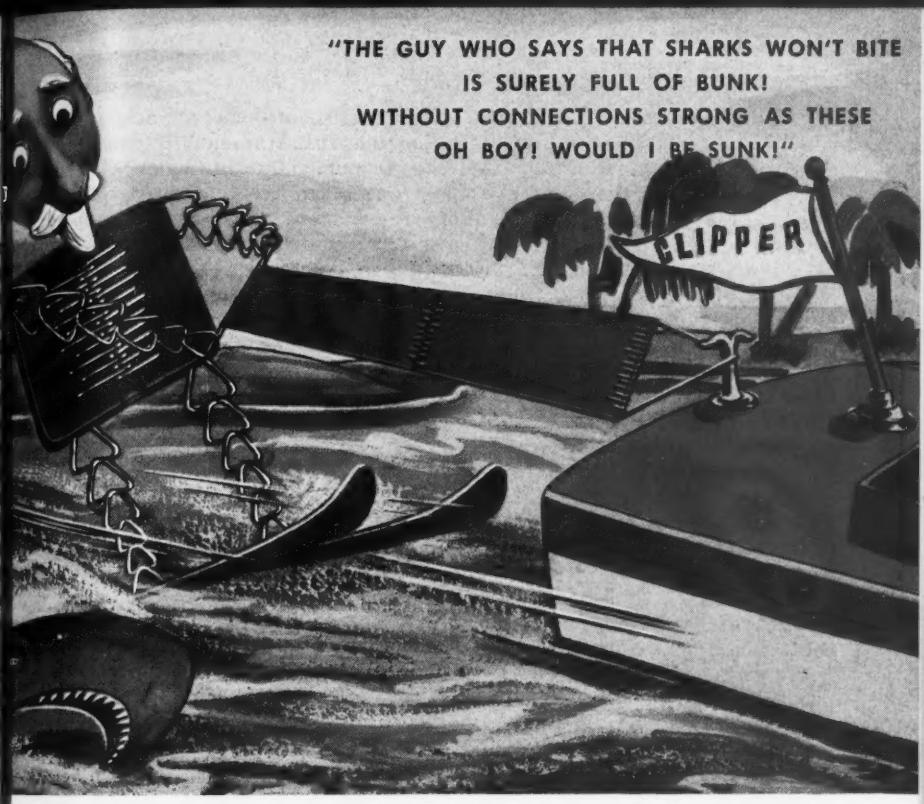
Hydraulically - controlled pressure permits unlimited combinations of pressure adjustment during the operating cycle. By this means pressure can be increased or decreased in proportion to the amount of work to be done and according to the degree of control desired in creating final surface smoothness. It comprises the greatest advancement in the hon process since the development automatic type tools.

Co-directional Microfinish

Recent investigations by piston r manufacturers indicate that eng cylinder bores will ultimately deve a service-worn surface finish with wear marks running longitudin on the cylinder wall, or in unifo direction with the bore axis. This curs regardless of the length of t they are in operation or of the m ner in which they were origin processed. A surface finish read of this roughness, taken annular will average from 5 to 8 mic inches, r.m.s. It is further indica that this type and degree of surf irregularity is maintained for a c siderable length of time.

This coordinates with the prac which was introduced several ye ago in the aviation engine manuf turing industry by government spectors. In compliance with their quest, engine manufacturers h been straight-line lapping finis engine cylinder barrels, using ab sive paste applied with cast i shoes. Honing tools which have b supplied in the past to various eng manufacturers and to air depots h been arranged so that such cast i shoes could be substituted for st holders in the tools.

This requirement prompted the velopment of equipment which w incorporate the greater degree controlled cutting action obtain by the use of bonded abrasive. you will note in Fig. 13, an arra ment of interlocking stones is in such manner as to present c plete annular abrasive contact at times during operation. With tools, the conventional honing a ation is used to obtain a very smo crosshatched surface finish within

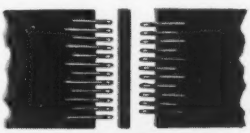


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conventional range of from 1.5 to 5 microinches, r.m.s. Following this operation, the rotation of the tool is stopped and it is then simply reciprocated longitudinally in the bore with a few degrees of indexing applied between selected strokes.

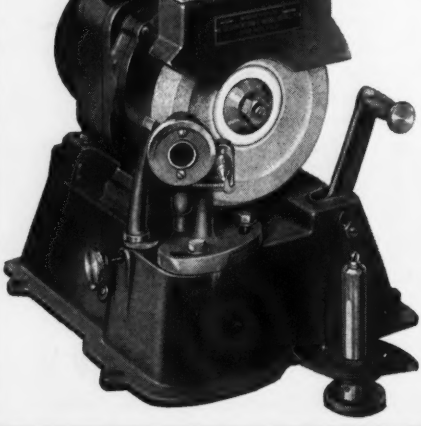
Similar finish is used in some ordnance assemblies, such as gun recoil mechanism cylinders. It is significant of the merit of such finish that these assemblies are commonly subject to storage for a duration of 6 to 10 years, at the end of which time they are said to have maintained the original hydraulic pressures with which they were assembled.

The foregoing material has been prepared to analyze the mechanical advantage of the hone abrasing method of processing, and to show that it has proven economic advantages, as follows: (1) it provides high productivity with very low capital investment, (2) it accomplishes substantial amount of stock remov economically in balance with t combined result desired, (3) it do not over-burden previous operatio by requiring maximum precision a complishment, (4) it corrects err produced in previous operation, (it combines four results in one pro ess, such as dimensional accuracy form and of size, controlled, ada table stock removal and any desir type or degree of surface finish, (it offers processing safety for ma parts which are easily scrapped other machining processes, and it conserves metallurgical efficienc

(The concluding section of this article will published in the October number of MODE MACHINE SHOP.)

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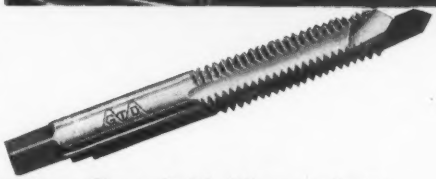
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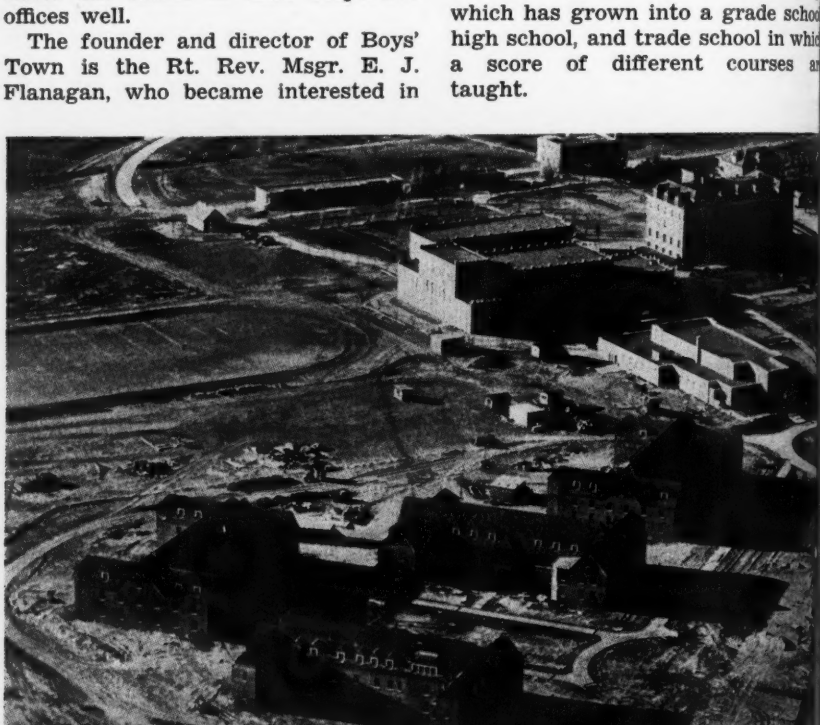
GTD GREENFIELD

TAPS · DIES · GAGES · TWIST DRILLS · REAMERS · SCREW PLATES · PIPE TOOLS

"Boys' Town" Needs Tools

TEN miles west of Omaha is an incorporated village which consists, with the exception of Father Flanagan and his assistants, entirely of boys. The village officials are boys, elected by the boy citizens, and they fulfill the duties of their respective offices well.

The founder and director of Boys' Town is the Rt. Rev. Msgr. E. J. Flanagan, who became interested in homeless boys some twenty-five yea ago. Acting on the theory that n boy wants to be bad, and that if th energy of a boy can be properly d rected he can be developed into useful citizen, Father Flanagan star ed out with a "home" of five boy which has grown into a grade schoo high school, and trade school in whic a score of different courses a taught.



Upper Right—Dormitory which is soon to become a school. Upper Center—Main school bui ing. Lower Left—New dormitories which will enable Fr. Flanagan to accommodate as ma as 500 boys and thus receive many who are being turned away due to lack of room.

Boys' Town now has 210 citizens, all receiving good educations and the opportunity to learn trades and arts by which each may maintain himself when he has graduated from Boys' Town and taken his place in society. Among the trades taught at Boys' Town are: printing, linotype operation, shoe repairing, laundry operation, clerical work, farming, dairy farming, carpentry and woodworking, cooking, landscape gardening, and others. All of these trades are taught by competent instructors who are capable craftsmen in their own lines and who, during the required periods, instruct their youthful charges in the operation of the machines and equipment.

Recently so many of the boys have expressed the desire to learn the machinist trade that Father Flanagan has approved plans for establishing a school of machine shop instruction and has, through the generosity of several machine tool manufacturers, received a considerable amount of equipment for the shop. However, several items are still needed, as follows: a No. 2 Universal Milling Machine with dividing head and change gears, vise, and vertical milling attachment, for individual motor drive; an 18 x 6-in. surface grinder (or approximate size); 14-in. or 16-in. crank shaper, back geared, with vise, for individual motor drive, and No. 2 and No. 4 open back reclinable punch presses.

Any machine tool manufacturer or other manufacturer who has machine tools that can be spared of the kind or similar to those described can do an incalculable amount of good by contributing them to the new Boys' Town machine shop. In writing, just address Fr. E. J. Flanagan, Boys' Town, Nebraska.

Speedmaster Pulleys. An approved A.S.T.E. data sheet covering Speedmaster Variable Speed Pulleys has been brought out by The Speedmaster Co., 1301-7 Washington Ave., South, Minneapolis, Minn. Copy free upon request.

Red Ring Broaching is the subject of a four-page bulletin now being issued by the National Broach & Machine Co., Shoemaker and St. Jean Sts., Detroit, Mich. Illustrations showing several different types of Red Ring broaches such as spiral push, spiral pull, straight spline push, straight spline pull, spiral involute form push, slab, and so on, are contained in the bulletin. Naloy, a ferrous alloy developed especially by Red Ring engineers for broaches and form tools, is also described. Copy free upon request.

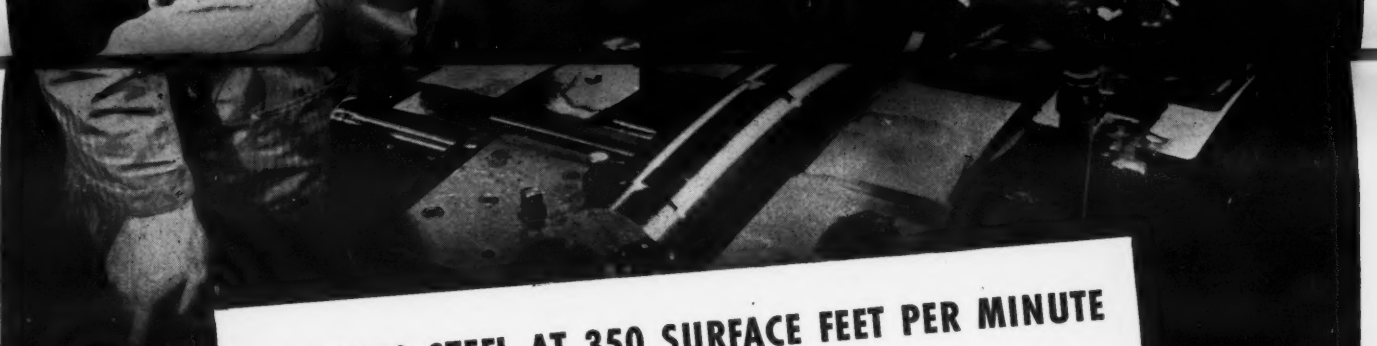
Kennametal Steel and Metal Cutting Tools and Blanks. A practical guide for the care and use of carbide-tipped tools is contained in a 32-page catalog which has been issued by the McKenna Metals Co., 300 Lloyd Ave., Latrobe, Pa. Known as Catalog No. 3, it contains complete descriptions, drawings and recommended uses for standard Kennametal tools and blanks for turning, boring, and facing steel and other metals. Features of the catalog include descriptions and drawings of the new Styles 19 and 20 tools for shapers and planers, as well as standard face mills and shell end mills tipped with Kennametal. The new Kennametal grades K2H and K3H are described and their uses indicated.

Also catalogued are box tools for Warner & Swasey machines, with five sizes listed, as well as several other semi-standard Kennametal-tipped tools. The section on grinding Kennametal is full of helpful information, including instructions on how to avoid grinding cracks. The brazing of tools with Kennametal blanks is completely described and illustrated.

The catalog has been designed to make the ordering of Kennametal tools and blanks as simple as possible. It should prove useful to both purchasing agents and plant operating officials. A copy of the catalog will be sent free to those who request it on their company letterheads.

SUNOCO PUTS ACCURACY AND FINE FINISH *on a production basis*





Removing 35 cu. inches of metal a minute on an 18" x 54" American Pacemaker Multi-Production Lathe.

SAE 1050 STEEL AT 350 SURFACE FEET PER MINUTE

When this is the order for production there must be the closest coordination between machine... metal... tools... cutting lubricant ... and above all the mechanic.

That's why skilled mechanics throughout the metal working industry choose SUNOCO Emulsifying Cutting Oil, when it is necessary to take heavy cuts at high peripheral speeds with cemented carbide tools. They know the high heat absorbing and lubricating properties of Sunoco keep the work and tools cool... its washing action prevents chips from clogging... and produce more accurate work in less time.

Next time the production order looks tough take a tip from the leading machine tool builders. They know to save production time... tools and material... it pays to specify

SUNOCO
EMULSIFYING
CUTTING OIL

Photograph Courtesy of American Tool Works Co.

SUN OILS

PETROLEUM PRODUCTS FOR ALL INDUSTRIES

17th Annual Convention of National Association of Foremen

Hotel Gibson, Cincinnati, Sept. 26 to 29

Charles R. Hook, President, American Rolling Mills, and Donald R. Richberg are among the featured speakers who will address the 17th annual convention of the National Association of Foremen at the Hotel Gibson, Cincinnati, September 26th to 29th. Hundreds of plant executives from leading industrial plants will attend the four-day sessions and the concurrent exposition of industrial equipment, it is stated by the association.

Other speakers who will deliver addresses at the convention include A. C. Cosgrove, vice president and general manager, the Crosley Corporation; V. N. Braden, the Goodyear Tire & Rubber Company; Major Fred McMahon, U. S. Army, and Dr. Charles Copeland Smith, National Association of Manufacturers.

In addition to meetings devoted to discussion of organization techniques in foremen's club, the convention will examine problems confronting the foreman as the result of current defense activities, the responsibility of foremen to management and management to foremen, legal problems, job simplification, personnel problems and related subjects.

President of the National Association of Foremen is A. C. Horrocks, Goodyear Tire & Rubber Company. Other officers are: executive director, F. J. Schaeffer, Republic Steel Corporation; executive vice president, S. Coler, Westinghouse Electric Manufacturing Company; secretary, H. G. Evans, Goodyear Tire & Rubber Company, and treasurer, Edw. Seving, Sidney Grain Machinery Company.

A. S. T. E. Semi-Annual Convention

Cincinnati, Ohio, October 17 to 19 inclusive

"Tooling with men and machines for National Defense" will be the keynote of the semi-annual convention of the American Society of Tool Engineers, scheduled for Cincinnati, Ohio, October 17th to 19th, according to an announcement by Ford R. Lamb, executive secretary.

The three-day session is to be attended by tool engineers from all mass production industries. The program will include both technical sessions and inspection trips to all machine tool and production plants in the Cincinnati area—a major center of manufacturing equipment for armament production.

The sessions will include a sym-

"The Blade in the Plaid Box"

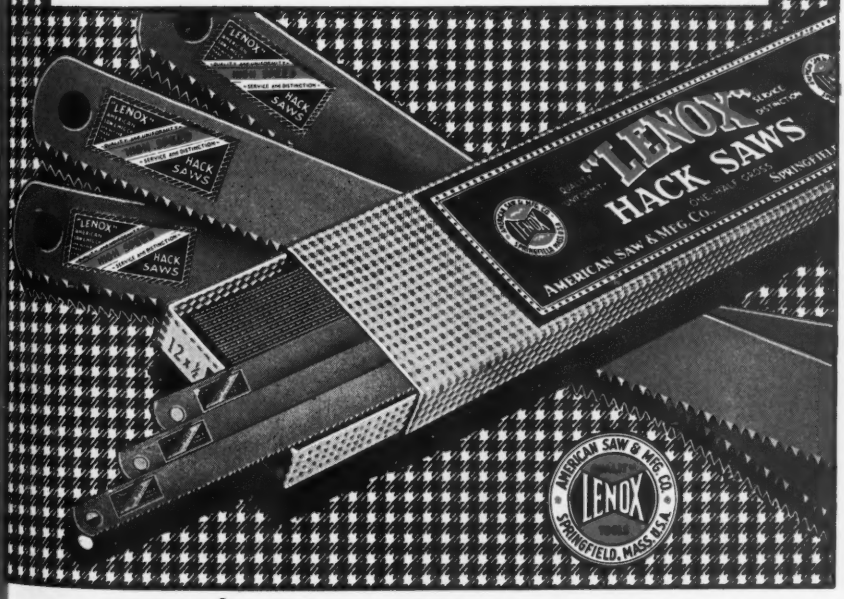
METAL CUTTING FOR DEFENSE!

One important factor to a successful National Defense Program is proper metal cutting. There will be a lot of it done and it must be done right.

Hundreds of shops whose work demands quality and uniformity are finding "LENOX" the answer to their problems.

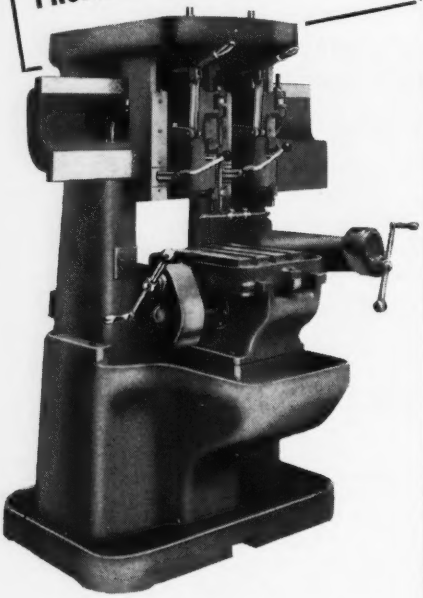
Furnished in "HIGH SPEED," "MO-SPEED" (molybdenum) "TUNGSTEN" and "SUPER-FLEX" and carried by selected distributors from Coast to Coast. Try them today.

AMERICAN SAW & MFG. CO.,
SPRINGFIELD MASSACHUSETTS



NEW

HIGH SPEED VERTICAL PROFILER & MILLING MACHINE



Designed for accurate, low cost production of small interchangeable parts.

Cross rail design with slide castings carrying spindles and motors assures vibrationless performance. Table may be dropped to increase distance from spindle to table (maximum, 12").

Standard machine has 2 spindles or single spindle (if specified). Write for Bulletin 12M.

MOREY MACHINERY CO., Inc.

410 Broome St. New York, N. Y.

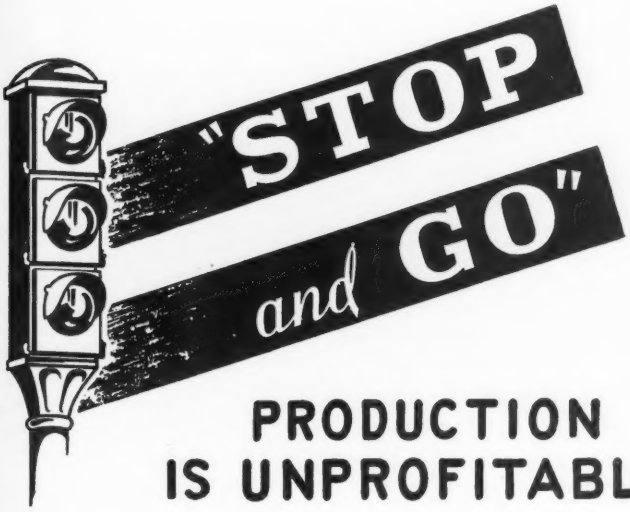
posium on the subject of "Shou Industry Assume the Burden of Spe ial Education," with all viewpoints the question to be presented. T subject is regarded as of immedia vital importance in view of the pre ent shortage of trained tool engine and designers in industry.

"Aeronautical Preparedness" will the subject of the dinner meeting the 18th, while technical progra will include a symposium on ge production methods.

"Over 75 Years Experience." Ree Prentice Corporation, Worcester, Mas has announced the publication of a bu letin entitled "Over 75 Years Experienc containing representative shots of t various departments throughout plant. The pictures show in conside able detail the facilities at the servi of customers for the production of mo ern Reed-Prentice machine equipme Copy free upon request.

Pompton Corinth Straight Carb Tool Steels. A complete description t gether with suggested uses and sho data applying to Pompton Corint Straight Carbon Tool Steel is contain in Folder TS-1 which is now being di tributed by the Allegheny Ludlum Ste Corp., Oliver Bldg., Pittsburgh, P Copy free upon request.

Cincinnati 28-In. Vertical Hydro-T Milling Machine, particularly suitab for die work, is profusely illustrated an described in a 16-page catalog, desi nated as No. M-865, which is now b ing published by The Cincinnati Milli Machine Co., Cincinnati, Ohio. Ou standing features of the unit which a said to provide greater profit throug maximum metal removal and fas handling are listed. A double-pa spread containing illustrations showi five operations performed from a sing setup of the Cincinnati Vertical Hydr Tel is also included. In addition, t catalog contains a complete table specifications, a dimensional drawi and various other information regardi the Cincinnati Hydro-Tel unit. Co free upon request.



PRODUCTION
IS UNPROFITABLE!

USE the Unisorb Machine Foundation and reduce your shutdowns, breakage, and repairs due to vibration or vibration transmission. Through research and actual working experience, Felters' engineers have proved the efficiency of Unisorb Machine Foundations in reducing vibration to a minimum in industrial plants. Unisorb Machine Foundations can be placed under new or old machines with equal ease.

Installation is simple, cost is low, and results are satisfactory.

• •

Write today on your company letterhead for your copy of the booklet, *"Unisorb in the Industrial Plant"* which describes many different kinds of installations of machinery.

The Felters Company, Inc.

210 SOUTH STREET Dept. L-9 BOSTON, MASS.

OFFICES IN PRINCIPAL CITIES

Modern Equipment at Work

An Answer to the Waste Material Problem

THE problem of handling the waste metal or "scrap" resulting from the processing of parts in the machine shop is one that in many cases proves to be a "headache" to the plant superintendent. The method used by one manufacturing concern to solve this problem is, to say the least, most interesting.

This plant processes large quantities of sheet tin and other sheet metal, producing large quantities of scrap which must be gathered at regular intervals and baled for shipment to scrap dealers. Before baling, however, the scrap is put through a furnace where all tin is reclaimed, then the steel scrap is put through a shredder which chops large pieces into smaller ones after which it is pressed into bales approximately 18 x 15 in. in size. Each bale is pre under 300 tons pressure and wei about 200 pounds.

In handling and baling this m terial, one of the most difficult pr lems is that of weighing the ba The operators are paid on a tonn basis; thus it is imperative that e bale be weighed quickly and ac rately. This task is performed to t satisfaction of both the workers a the management, however, by t use of a dial scale with built "printer" and an electric eye.

As the picture shows, the bales weighed on a Fairbanks Dial Sc which has a chart graduated to pounds by 1 pound and without t or capacity beams. The scale equipped with a Printomatic t clock, one bank of letters, one b of numbers, and one bank of spe symbols. The printer is equipped w double roll tape. A section of ro conveyor mounted on t scale platfo and an end belt, 9 ft. l and 36 in. w passes over t scale platform underneath



Fairbanks Dial S Equipped with P ing Attachment cords Weight Scrap Bales as T Are Conveyed O the Platform



EDLUND

LINE-UP FOR TODAY'S PROFITS

This drilling line-up was designed by EDLUND Engineers to provide a wide range of speeds on one machine at the lowest cost without sacrificing efficiency.

The spindle on the left is the hand feed, No. 1B Machine with 12" overhang, ½" capacity in steel.

The next spindle is the hand feed No. 3B Machine. ¾" capacity in steel.

The next spindle is the power feed, No. 3B Machine with reversing motor for tapping and back gears providing 8 spindle speeds, 1" capacity in steel.

The fourth spindle is the power feed, No. 4B Machine with back gears, 1¼" capacity in steel.

The same EDLUND Engineers will be glad to make recommendations on your drilling and tapping set-up. Write for complete details.

EDLUND MACHINERY CO., INC.

CORTLAND NEW YORK

scale box. The belt speed is about 12 ft. per minute.

As the bale comes from the baling press and drops onto the moving belt, it is carried across the scale platform. As it passes over the center of the platform it intercepts the light-beam from the photo-electric cell, which automatically trips the printing mechanism and prints the weight on a record.

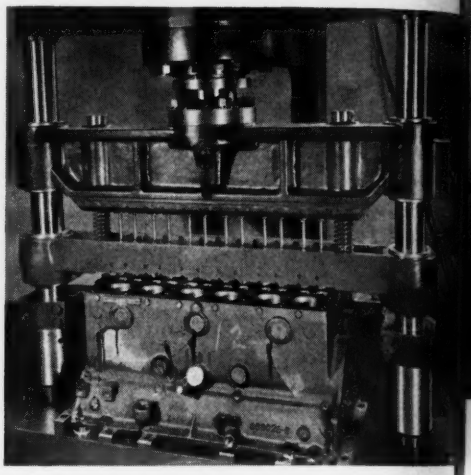
The Printomatic is set to weigh a bale of scrap metal about every 20 seconds. As shown in the illustration, the housing over the scale platform is closed on two sides and at the top to prevent the shadows of the workmen as they move about the scale from striking the sensitive electric eye and tripping the mechanism.

The entire job is automatic and thus not subject to the whims of an operator, in consequence of which all disputes with the workmen have been eliminated.

Chrysler Machine Burnishes Valve Stem Guides

AN operation which combines burnishing, for size and finish, with impregnation of the surfaces wi lubricant for easier running in, being used in regular production Chrysler for the valve stem guides its six-cylinder engines.

Special machines were develop



Special machine developed by Chrysler for ball-burni ing and pre-lubricating of valve stem guides. The pl gers under hydraulic pressure force steel balls th through the guides after they are given a shot colloidial graphite suspended in oil.

for this operation which consists pressing steel balls through the val stem guides to burnish them for fi surface finishing in keeping with t use of superfinishing for other engi parts. As the balls are forced throug



GREENERD
Arbor Presses
500 lbs. to 35 tons pressure
HYDRAULIC, MOTOR DRIVEN, HAND OPERATED
Greenerd Arbor Press Co., Nashua, N. H.





IT'S DONE RIGHT

with WRIGHT *Improved High Speed* HOISTS

Every **Wright Improved High Speed Hoist,** in any capacity from ¼ to 50 tons, has 21 definite points of superiority. Precision load wheel bearings assure fast, smooth, positive action. Full zinc coating resists corrosion. The Wright safety guard always keeps the load chain in the pocket, regardless of operating position.

Wright Trolleys serve as reliably and economically as Wright Hoists.

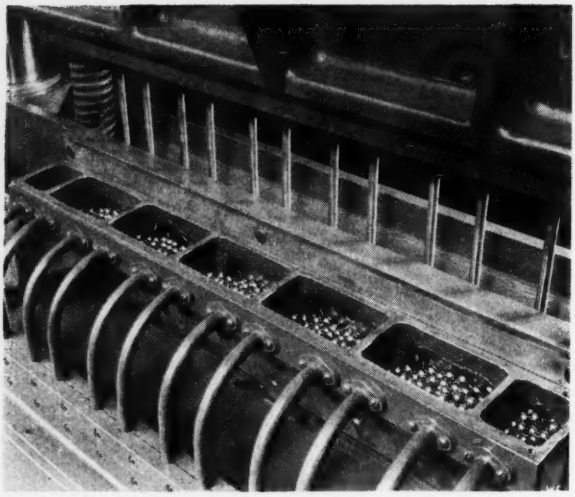
The Wright Catalog includes much valuable hoisting information. Write for your free copy.

BUY ACCO QUALITY *in Wright Hoists, Cranes and Trolleys; Tru-Lay Preformed Wire Rope; Reading-Pratt & Cady Valves; Campbell Abrasive Cutting Machines; American Chains; Page Welding Electrodes and Page Wire Fence.*

WRIGHT MANUFACTURING DIVISION • YORK, PENNSYLVANIA

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.



Closeup of rear view of the special Chrysler machine for ball-burnishing and pre-lubricating valve stem guides in six-cylinder engines. Balls are released one at a time from the hoppers shown, and automatically return to the hoppers after dropping out through the bottom of the block.

the balls and guides are given a shot of colloidal graphite suspended in oil. The "dag" graphite is so finely divided that minute particles are apparently imbedded in the surface metal of the guide providing a certain amount of pre-lubrication.

The machines, shown in the accompanying illustrations, are hydraulically operated and are built with beds at conveyor height, so that cylinder blocks readily slide into them.

When the block is in place, the operator presses a foot pedal which releases a steel ball from a tube immediately over each valve guide. A shot of graphite oil is simultaneously squirted into each valve steam guide. A row of plungers then move down, pushing the ball through the guide. The balls drop out through the bottom into a reservoir containing graphited oil and are carried back up into hoppers in the machine fixture, ready for re-use.

If desired, several balls can be pushed through in turn by merely depressing the trip release a second or third time. The use of hoppers prevents too frequent re-use of the same balls.

Fafnir Bearing Condensed Catalog. A catalog designated as the No. 35X has been issued by The Fafnir Bearing Co., New Britain, Conn. A smaller, condensed edition of Fafnir's large catalog, the No. 35X is a handy, 6¼ x 8½-in. size, and includes detailed information of value to any bearing user.

The catatlog gives full data on dimensions, load ratings, types and sizes of Fafnir bearings, covering the complete line of Fafnir radial, thrust, precision, self-aligning, and sealed bearings and housed transmission units. More than 55 distinct types, embracing over 100 series, are cataloged in the 130-odd pages of tables, diagrams, and illustrations. Copy free upon request.

Dumore Tap and Drill Chart. A handy chart designed to save time and eliminate guesswork when figuring on machine shop jobs involving the use of tap drills or twist drills has been prepared for distribution by The Dumore Company, Dept. 180-A, Racine, Wis. The chart includes a tap drill table for A. S. M. E., U. S. and SAE standard screws, a twist drill and steel wire gauge table, and tables of decimal equivalent and wire gauges in approximate decimals of an inch.

For practical purposes, the chart is printed on durable stock to be tacked up for quick reference in shops, drafting rooms, and engineering departments. Chart free upon request.

3 Big Advantages

Because The Tap Establishes Its *OWN* Lead

1. More Accurate Tapping
—with every thread uniform.

2. Greater Production
—with less spoiled work.

3. Less Tap Breakage.

The new Procunier Universal Tapping Machine is so designed that it actually allows the tap to establish its own lead. There is nothing more accurate than the tap itself in thread-cutting—so maximum tapping efficiency is attained where the tap is free to establish its own lead in cutting the thread.



HOW ONLY PROCUNIER ACCOMPLISHES THIS

Here is the exclusive combination of Procunier features that makes this possible: 1. Counter-balancing features that remove weight from tap. 2. Sensitive friction clutch that engages smoothly at high speeds. 3. Compensating springs between foot pedal and tap that provide uniform pressure on every hole **independent of the operator.** 4. Rigid spindle that holds tap accurate. 5. The smaller, lighter, more sensitive and accurate Tru-Grip holder. 6. Both hands free for handling work. PLUS many other advantages. Tapping operations are performed so quickly on this unit that most time is spent loading and unloading parts. In this connection, quick acting tapping fixtures are a vital factor—and here Procunier Engineers with over 30 years of tapping experience can help you solve your tapping problems. Send coupon below for Special Bulletin 38 and full details.

PROCUNIER

SAFETY CHUCK COMPANY

12 S. Clinton St. Chicago, Illinois

Procunier Safety Chuck Company
12 So. Clinton St., Chicago, Illinois

Send me bulletins on: ☐ *Universal Tapping Machines* ☐ *High Speed Tapping Heads* ☐ *Tru-Grip Tap Holder.*

Name.....

Address.....

City..... *State*.....



IDEAS FROM READERS

Simple Radius-Boring Device

By H. A. EVARTS

HAVING been given the task of machining a lot of workpieces which involved boring a true radius in a bowl-shaped section, I was put to the necessity of finding some method of guiding the tool so that a true radius could be assured. The problem was solved by the use of a very simple piece of apparatus consisting of a steel bar **A**, connecting link **B**, and the two C-clamps shown in the illustration.

The bar was clamped to the back of the taper attachment on the lathe, then two holes were drilled, one in the bar and the other in the end of the cross slide, to which the connecting link **B** was pinned. The center distance between the holes in the link was the same as the radius specified for the interior of the workpiece. The cross slide was disconnected from the cross feed so that it could work freely and the tool was set in position for the boring operation. Feeding the carriage longitudinally caused the cross slide to be pulled by the link, thus describing an arc which was duplicated by the point of the tool, with the result that the radius was bored smoothly and even

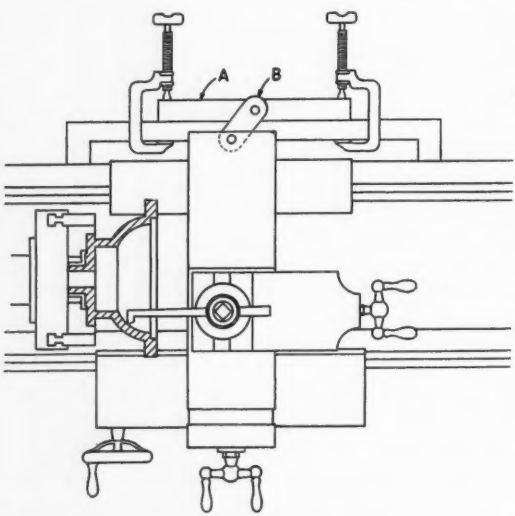


Diagram Illustrating Method of Boring a True Radius

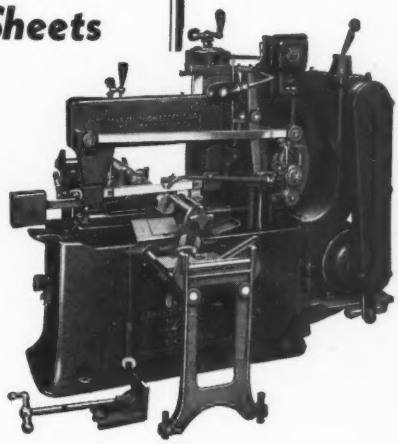
Jig-Punching Holes

By CHAS. H. WILLEY

ILLUSTRATED in the drawing Fig. 1 is a jig designed for use in punching small, easy-to-handle pa

In Actual Production *and On Cost Sheets*

MARVEL 6A and 9A Automatic Hack Saws stand alone



FOR automatic high speed production of identical lengths cut from bars, MARVEL 6A and 9A heavy duty, all-ball-bearing saws are unequalled. They will cut-off more pieces per hour (from long rifle barrels to thin gear blanks) and will produce them at lower cost than by any other method. Built for speeds, feeds and blade tensions impractical for other saws and equipped with an automatic bar push-up, they require no more attention than an automatic screw machine—will continue to cut-off identical pieces automatically until stock is exhausted or until automatic stop trips at the predetermined point. Operate to close tolerances.

•

Also serve as fast, efficient, general purpose saws. Bar push-up can be disengaged at any point, miscellaneous cuts made, and production work resumed by disengaging and re-engaging push-up.

•

Write for Bulletin

•

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U. S. A.
Eastern Sales Office: 199 Lafayette St., N. Y.

GROUND
To Give Keenness

these Midget Cutters often give 7 to 10 times the increase in production per dollar of tool cost.

And what's more --- **Severance guarantees** that they will give from **3 to 5** TIMES more production per tool — and keep on doing it every time they are re-ground.



So! Cut Your

Rotary Filing costs like one *Chief Executive who writes, **"It will cut our tool costs at least three-quarters."**

Write for Catalogue No. 12. Every Tool Man—Supervisor, Engineer or Designer — will want this little booklet, so pack full of time and money-saving ideas.

Profusely illustrated, it shows many unusual cutters and applications, lists Standard Midget Milling Cutters, "Chatterless" Countersinks, Tube Burring Cutters and Inside Burring Cutters as originated by

* Name on request.

Severance Tool Mfg. Co.

1516 E. Genesee Ave., Saginaw, Mich.

of the type illustrated in Fig. 2. The jig, **A**, is made from either tool steel or case hardened machine steel, and is drilled as indicated at **B**, the holes being machined out so that they will be bell-mouthed. The punching tools

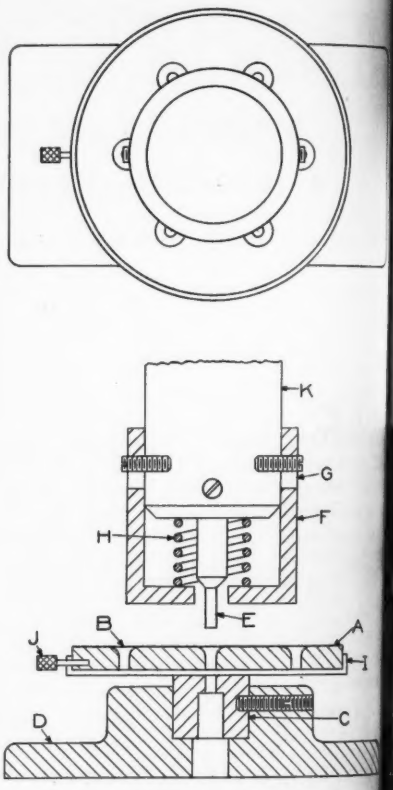
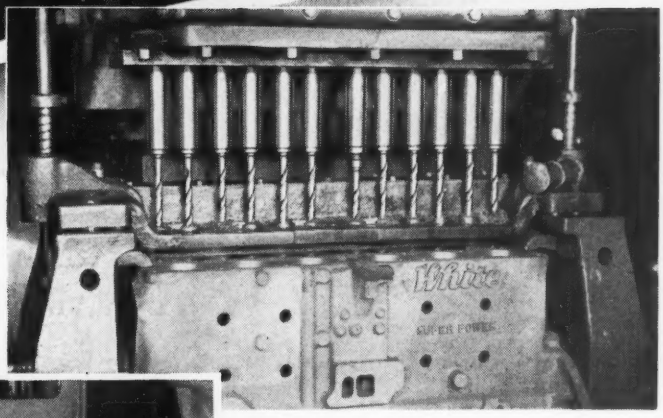
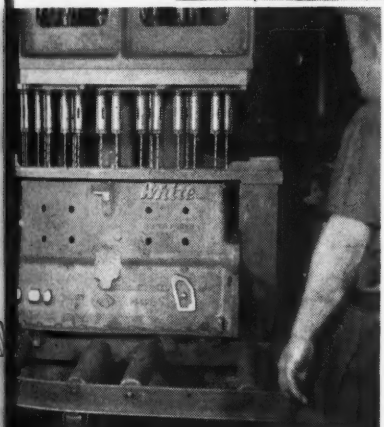


Fig. 1—Drawing of Jig Designed for Economical Punching

consist of the punch **E**, held in the punch shank **K**, around which is fastened the stripper **F**. The punch extends below the face of the stripper to a distance approximating the thickness of the jig **A**, so that the punch can enter the hole in the jig and line the jig up with the work to be punched. The punch, **E**, can be

TWO SUPERB EXAMPLES OF MULTIPLE DRILLING





Here are two splendid illustrations of multiple drilling. Twelve large twist drills in one operation, and 25 other sizes in another operation.

Notice how evenly these drills are wearing down, eliminating replacements and other troubles. One of the outstanding features of "Cleveland" Twist Drills is that, in multiple drilling, they work together.

Through long years of study and analysis, our Engineers have successfully applied modern steels and alloys to the manufacture of more and durable Drills and Reamers. They also have developed "Cleveland" Tools for the working of the various new materials—both metals and plastics—used widely in modern industry

Whether you test drills or depend upon the manufacturer for data, you can save much time and avoid spoilage of material by drawing upon "Cleveland" experience. Address any stockroom or your usual source of supply There will be no obligation.

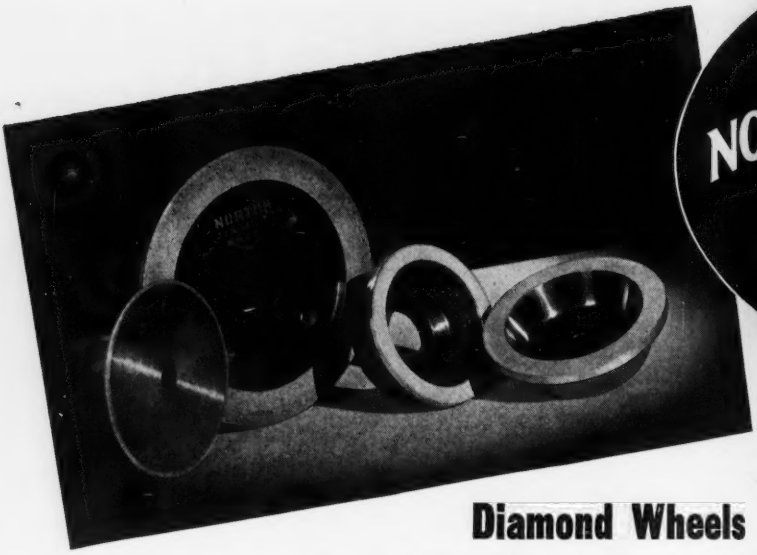
We favor adequate preparedness for National Defense

The CLEVELAND TWIST DRILL COMPANY
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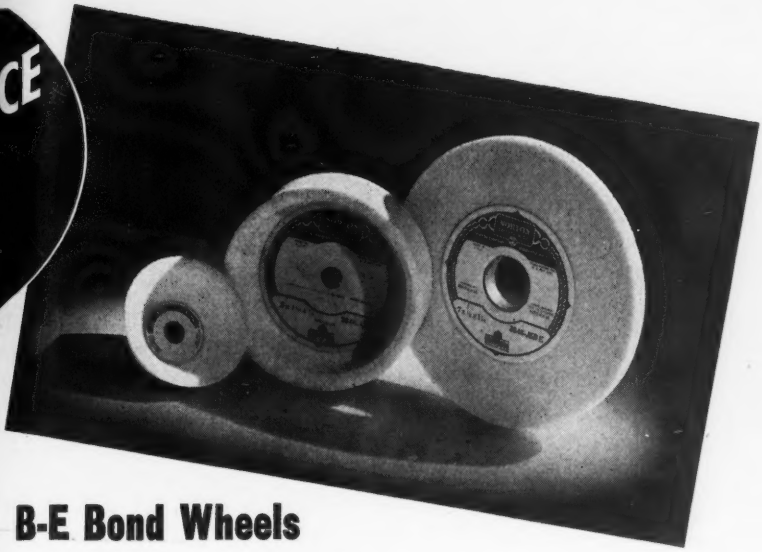
Diamond Wheels for the Cemented Carbides

FOR offhand sharpening or reconditioning single point tools, grinding new "milled and brazed" tools and grinding chip breakers there is the Norton Metal Bonded Diamond Wheel—a strong, heat-resistant wheel that is proving decidedly economical because of its fast cutting action and long life. For most tool and cutter grinding operations and for use in plants manufacturing cemented carbide tools in large quantities the Norton Resaloy (resinoid bonded) Diamond Wheel is recommended. Supplementing each other and in conjunction with the green Crystolon vitrified wheel they provide complete Norton Service for grinding the cemented carbides.

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NORTON ABRASIVES



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WORCESTER, MASS.

W-773

NORTON ABRASIVES

terchanged with others of various sizes. The parts **C** and **D** are the die and die shoe respectively.

In operation, the die and die shoe are lined up with the punch as shown, and the work **I** and jig **A** are placed

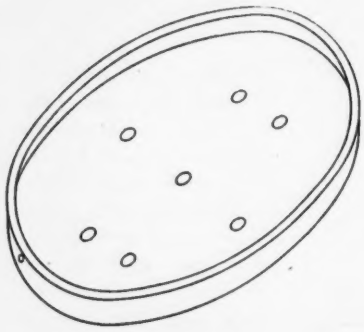


Fig. 2—Drawing of Typical Workpiece of Type for Which Tool Shown in Fig. 1 was Designed

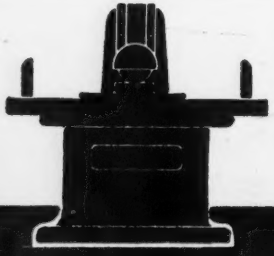
in position under the punch. The punch **E** is then brought down until it enters one of the bell-mouthed holes in the jig **A** with the stripper **F** resting on the jig. The press is now operated and as the punch is forced downward, the stripper **F** is held stationary by the jig, this action being possible due to the slots **G** in the stripper. As the punch lifts after piercing the work, the spring **H** forces the stripper down, forcing the jig and work off the punch. By moving the jig about, locating the bell-mouthed holes under the punch for alignment the holes in the work can be punched as accurately as though done by a punch and die of the type which has several holes. The pin **J** serves to locate the work on the jig.

Twist Drill Holder with Integral Guide

By W. N. Halliday, *England*

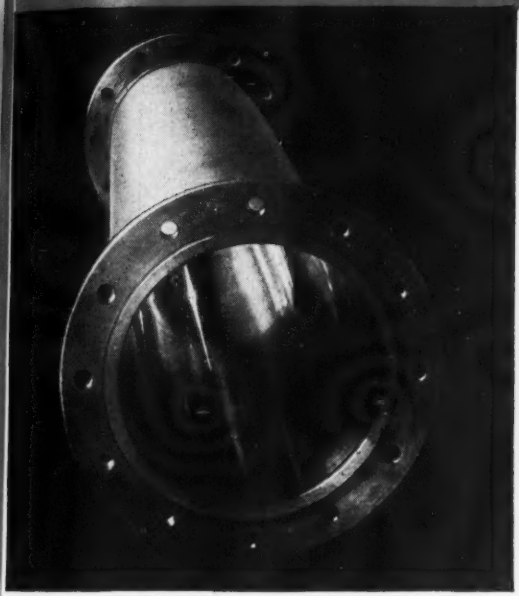
ILLUSTRATED in the cross section drawing is a most unusual yet very useful type of drill holder designed for use with the ordinary taper shank twist drill. The special feature of the holder is the incorporation of means for guiding the drill so as to ensure accurate sizing and spacing of holes without the use of a bushed drilling jig such as is ordinarily employed for such work. Where there are a number of holes to be drilled, however, a templet will expedite matters although the saving will still be great, as one templet will serve for drilling any number of holes and there will still be no need for expensive bushing.

The part indicated at **A** in the drawing is the drilling machine spindle, into which is fitted the sleeve **B**. The tapered shank of the sleeve **B** is bored to a fit for the taper shank of the drill, as shown, and a cross

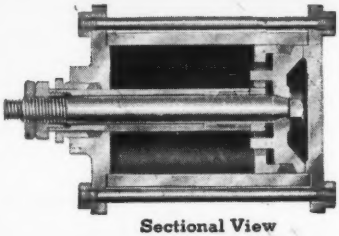


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Sectional View

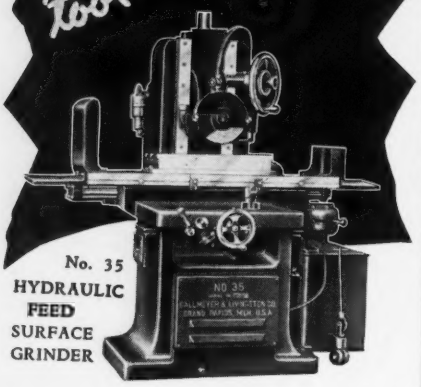
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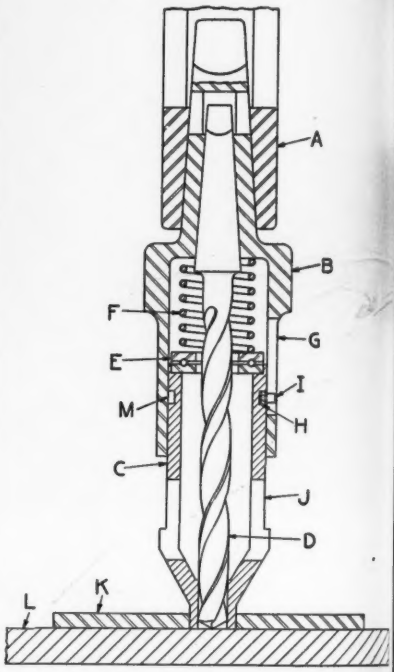
Longitudinal and transverse table movements operated hydraulically, any speed can be obtained up to the maximum of 115 feet per minute.

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GRAND RAPIDS, MICH.

hole is provided for the drift. The lower end of part **B** is turned down on the outside so as to leave a heavy shoulder which is later milled to hexagon shape. The sleeve is then bored as shown, to a diameter some 0.00 in. larger than the outside diameter of the guide bushing member **C**.

In the bottom end of guide bushing



Drawing Illustrating Design of Twist Drill Holder with Integral Guide

C a hole is bored of the same diameter as the drill, plus some 0.002 in. for a running fit. The guide bushing is then bored from the opposite end to a much larger diameter in order to provide clearance for the chips and for the admission of coolant. Cross slots, **J**, are milled in the wall of the bushing for this purpose. The guide bushing **C** is free to slide ver-

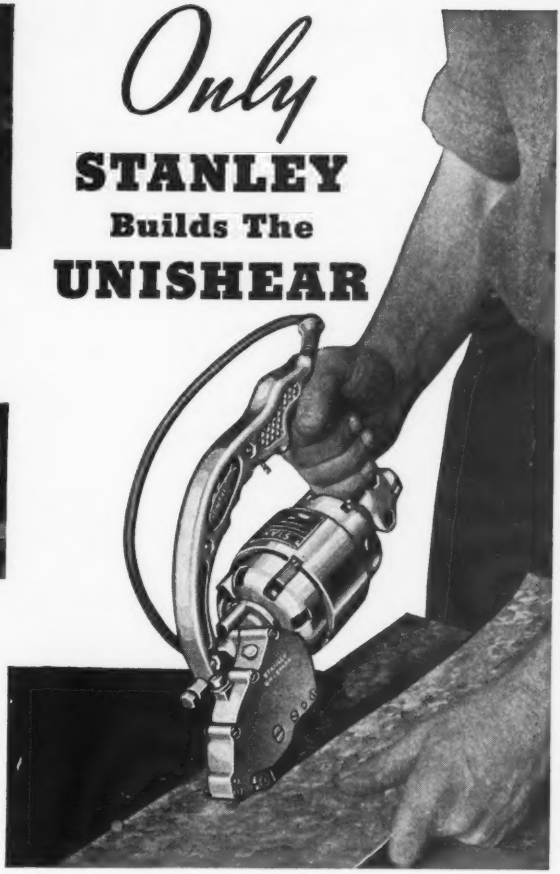


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STANLEY UNISHEARS

THE ELECTRICALLY DRIVEN HAND SHEARS

tically, yet is prevented from falling out of sleeve **B** by the simple expedient of milling a slot **G** in sleeve **B** in which the stop-pin **I** can travel vertically. Stop-pin **I** is threaded into a tapped hole in a brass ring which is loosely held in the annular groove **M**. The ring need not encircle the part **C** completely; if it extends one-third way around, it will suffice. Rotation of sleeve **B** carries the slider **H** around with the sleeve, while the bushing **C** remains stationary yet free to recede within the bore of the sleeve as the drill penetrates the work.

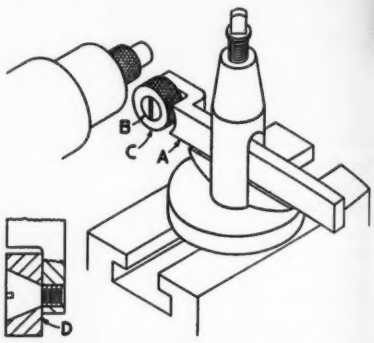
The method of using the holder is now evident. The lower end of the guide bushing **C** is made a close fit in the hole in the sheet metal templet **K**, and of course may be any size larger than the actual size of the drill that is most convenient. Templet **K**, after being accurately laid out and drilled, is clamped to the face of the workpiece **L** and the bushing **C** is depended upon for accurate drilling. Workpiece **L** may consist of a number of metal sheets clamped together.

By providing a number of slip bushings for the hole in the tip of the bushing **C**, different drill diameters may be accommodated. Another plan consists in providing a number of bushings of the type **C**, each with a hole of different size to suit different diameters of drills. Where the number of parts to be drilled does not warrant a special jig, or where time does not permit the manufacture of special equipment, the tool described above will give reliable service.

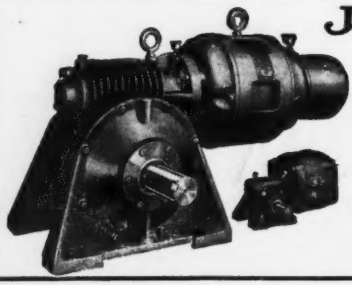
Tool for Knurling Close to Side of Shoulder

By W. H. CHARLES

CONFRONTED several times with the task of performing a knurling operation close up to a shoulder and finding no suitable knurling tool available, the writer devised the knurling tool shown in the drawing herewith. The tool consists of a bar



Drawing of Tool for Knurling Close to Side of Shoulder



Janette Speed Reducers

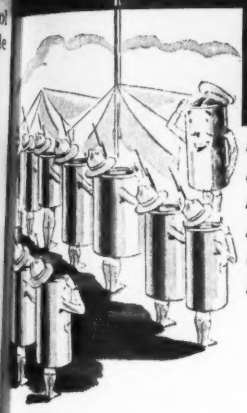
43 Styles—1/50 to 10 H.P.—.08 to 1140 r.p.m.

These 1/20 H.P. and 10 H.P. machines are two of the six sizes of the RW style of reducers, which are available in flange or foot types of mounting. Janette speed reducers are compact, rugged, pleasing in appearance, easy to install or maintain, reasonably priced, built complete and guaranteed by ONE organization.

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BUNTING

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PRECISION BRONZE BARS • BABBITT METALS

of suitable size machine steel, **A**, forged and offset at one end as shown. The offset is drilled and tapped to receive a special taper stud, **B**, carrying a special knurl, **C**, which is shown in cross section at **D**. As can readily be seen, the taper of the stud prevents the knurl from traveling and should be kept well oiled so as to enable the knurl to revolve freely.

To use, the tool is merely clamped in the tool post of a lathe and then fed against the portion of work to be knurled.

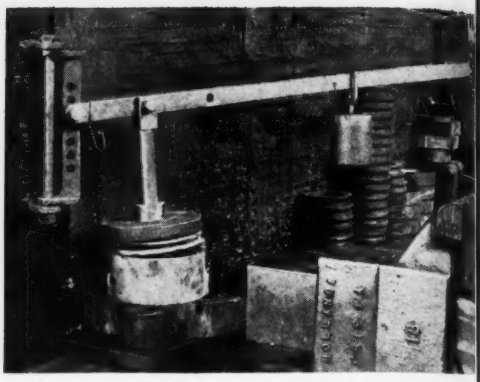
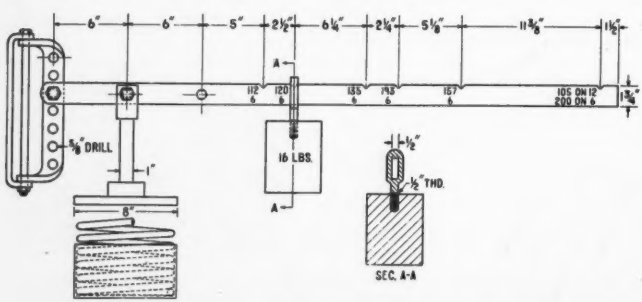


Illustration Showing Device for Testing Rod Packing Springs

Testing Piston Rod Packing Springs

By W. H. NOSTELL

PRACTICALLY every make of metallic piston rod and valve rod packing is held in place in the packing cup by means of a coil spring that tends to force the packing into the cone-shaped packing cup and causes it to grip the rod, thus effecting the seal. Superheated steam destroys the life of the springs, thereby making it necessary to renew the springs when they will not support a certain specified weight at working height. Shown in the photograph is a device designed for testing the stiffness of the coil springs. Details of the device are presented in the drawing also shown herewith.



Detailed Drawing of Device for Testing Rod Packing Springs

The device is fastened to the wall so that it can be swung over the bench or back against the wall when not in use. The bolt on which the device pivots, shown near the left edge of the drawing and illustration, is ¾ in. wide, and 48 in. long, and is notched and calibrated so that by adjusting the movable weight along the beam, the desired pressure in pounds may be obtained on the pusher or ram at the left of the movable weight. To extend the capacity of the device, the ram has two positions; one 6 in. from the fulcrum and the

Swings into any desired position --and stays put

The accompanying photographs suggest the amazing flexibility of the Dazor Floating Lamp by illustrating a few of the countless positions obtainable. It may be raised, lowered, pushed, pulled, swung completely around by a mere finger's touch — and stays rigid at the exact angle placed, WITHOUT ADJUSTMENT OR LOCKING, the arms being scientifically counter-balanced by a spring.

Dazor Floating Lamps mean correct localized lighting, with no glare, no eyestrain. They soon pay for themselves in greater efficiency.

Five types of bases available for clamping or screwing to lathes, drills, presses, shapers, milling machines, benches, drafting boards, desks, walls, business-machine stands. Also portable pedestal type.

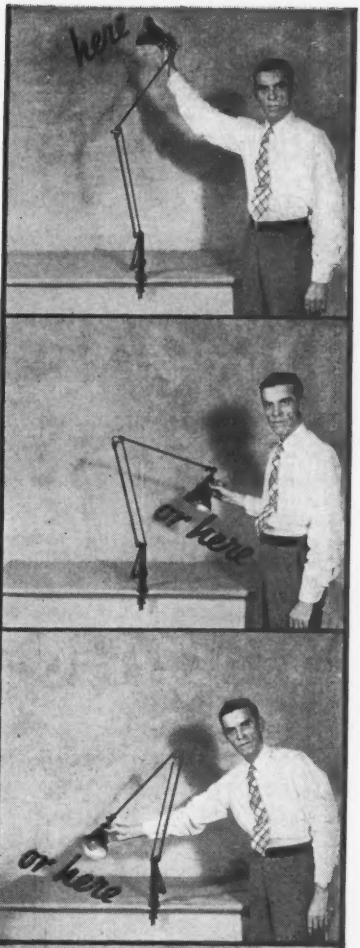
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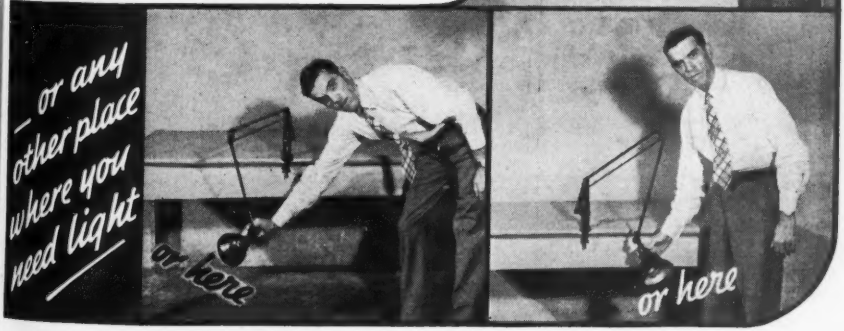
DAZOR MANUFACTURING CORP.
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Dazor *Floating* Lamps

Fluorescent and Incandescent

Y-3





other 12 in. from the fulcrum at the left.

The makers of "King" packing supply a table reproduced below, th indicates when the springs used wit their packing should be renewed.

Table of Spring Pressures for Replacements

Diameter of rod in inches	½	1¾	2	2¼	3	3¼	3½	3¾	4	4¼	4½	5	5¼	5¾	6
Pressure in pounds at working height (new spring) ...	100	100	100	100	120	130	140	150	160	170	180	200	210	230	24
Replace at	60	65	70	75	90	98	105	113	120	128	135	150	158	172	18

Billings 42nd Edition Forged Tools Catalog. This 176-page catalog, issued by The Billings & Spencer Co., Hartford, Conn., illustrates and describes chiefly Billings Vitalloy and carbon steel forged tools with a few pages devoted to Billings commercial forgings and board drop hammers. Among the forged tools listed are various types of Vitalloy wrenches, hammers, pliers, carbon steel wrenches, vises, screw drivers, and so on. Particular attention is given to the Billings crackle finish on the carbon steel line of wrenches and tools. The genuine "Coes and Bemis & Call line of wrenches no manufactured exclusively by The Bil ings & Spencer Co. is also described an illustrated.

The 42nd Edition Catalog contains sev eral pages of wrench selection table and tables of weights, as well as a nu merical index. The catalog is 8½ x 1 in. in size with loose-leaf pages.

Copy of catalog will be sent free o charge to any mechanical executive wh will address a request on his company letterhead.

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No more guess work—no more trials and experiments to see what depth of cut you are getting. This R-S tap is adjusted from the front end. Short turn of ring sets the depth.



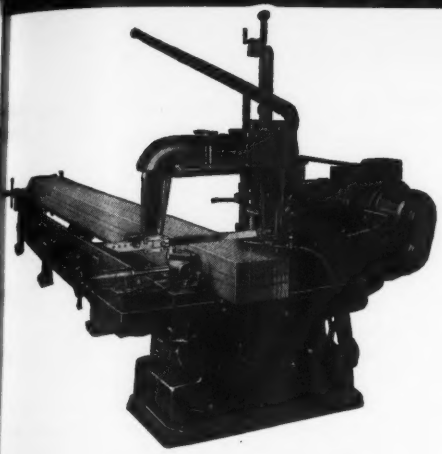
Ask About Model "C"

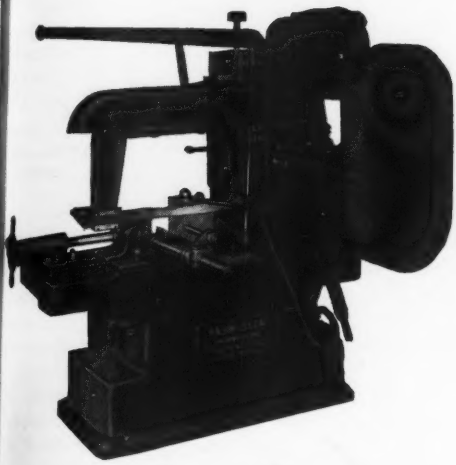
WRITE FOR TRIAL AT OUR RISK

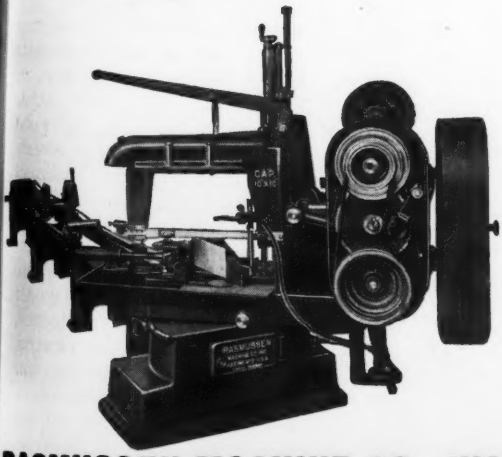
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Summary

AT last we seem to be definitely embarked on a program of preparation—for peace, we hope—for war, if need be. The events of the past year have made our position precarious, and only by making the fullest uses of our resources can we be assured of peace and safety.

Up to this writing we have displayed the inefficiency for which democracies are famous. With full knowledge that a foreign government is planning to attack the United States within nine months, our congressmen have spent days—almost weeks—debating whether we should conscript an army or not, and how big it should be.

At the present moment, according to figures just published, we have 218 tanks, with 526 on order. We have 2,000 airplanes fit for actual battle, with about 4,000 more that are said to be unfit. Some 6,750 planes are on order, of which 3,250 are combat and observation planes. It is expected that 2,200 planes will be delivered during the rest of this year and about 2,500 in the first half of 1941. (Let's hope that we are still able to make use of them.)

At time of going to press, William S. Knudsen, chairman of the National Defense Advisory Council, is making a survey of the airplane factories, shipyards, and other armament industries on the West Coast. As a result of his visit to the Boeing Airplane plant in Seattle it is reported that the capacity of the Boeing plant is to be doubled. And Boeing has just completed a big new unit. Increasing the production of Boeing bombers w mean doubling the 7,000-man force.

If the Todd Shipbuilding Compan at Tacoma, Washington, has to set u an entirely new plant for the co struction of destroyers, as it appea that they will, they will need a hug new crew of carpenters, machinist and other skilled mechanics. And i as a result of Mr. Knudsen's survey production is stepped up all along th line, there won't be enough skille workmen to supply the demand.

The ultimate goal of airplane pro duction, alone, is 50,000 planes. Fo each plane two trained pilots are re quired to fly it. That's 100,000 pilot The maintenance of each plane de pends upon five "ground" men. That another 250,000 men. Each bombin plane takes a crew of seven o more men — approximately 250,00 more. Roughly, a total of 600,000 men That is just an example of the nee that is developing for men—particu larly young men.

For several years, now, the ranks o the unemployed have annually bee augmented by college and high schoo graduates for whom no opening wa visible. Their opportunity is here— and there is no opportunity more im portant than that which makes i possible for a man to serve his coun try in an hour of peril. That hour is here.

Many industries have, or are setting up, training schools in which students can be taught machine operation, o plane construction, or given othe equally important training for good jobs. Application can be made direct ly to the industries. The National Youth Administration has developed its program of youth training and is doing a fine job. The Navy has just taken 5,000 youths to Hawaii where they are being trained in the Air Corps shops for work as mechanics, pilots, camera men, propeller experts and other Air Corps jobs If war comes, every man should do his share. If peace prevails, the training will not have been in vain.



WHEN PRECISION GUARDS PRECISION

It is an old saying that "it's a poor workman who blames his tools". But shop foremen know that even the best operator cannot turn out precise and well finished work on a lathe with worn or faulty headstock gears.

To make sure of maintained accuracy at this vital spot, a well-known lathe maker has standardized on carburized Nickel-Molybdenum steels — using SAE 4815 for drive gears and SAE 4615 for the transmission gears.

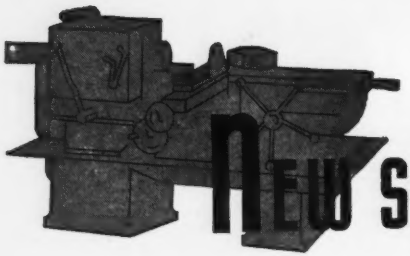
These two Molybdenum steels, in addition to having the requisite core strength and toughness, carburize to 55-60 Rockwell "C" with minimum distortion. Consequently proper initial adjustment is simple and freedom from trouble due to worn teeth is assured for an extended service period. Thus precision guards precision for years.

Rechecking your own specifications may disclose opportunities for increasing serviceability of the product by a change in materials. You will find our book, "Molybdenum in Steel", helpful. It is sent free on request.

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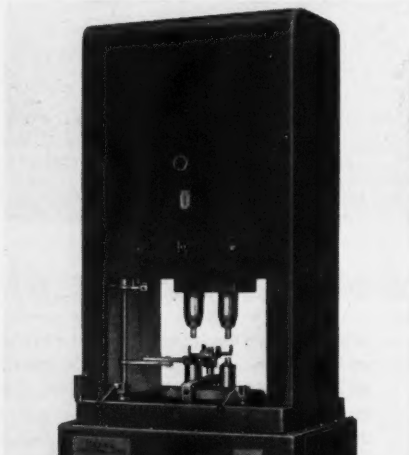
MOLY



NEW SHOP EQUIPMENT

Hanna Electric-Hydraulic Riveting Press

The line of electric-hydraulic riveting presses manufactured by Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill., has been augmented by the type shown in the illustration herewith. In the design of this machine, the required floor space has been held to a minimum. Motor, pump, controls, piping, cylinder, and reservoir are totally enclosed, a construction which permits the use of a motor of the open frame type and results in a complete machine of streamline design. Front and rear panels can be readily removed so as to make motor, pump, and reservoir accessible. A side panel affords access to the controls. The entire machine, it is said, can be lifted out of the base without disturbing a hydraulic, electrical, or mechanical element.



Hanna Electric-Hydraulic Riveting Press

According to the manufacturer, from one to six or more rivets can be driven simultaneously with equal pressure exerted on each rivet regardless of variation in length, hardness of rivet, or ordinary variation in grip.

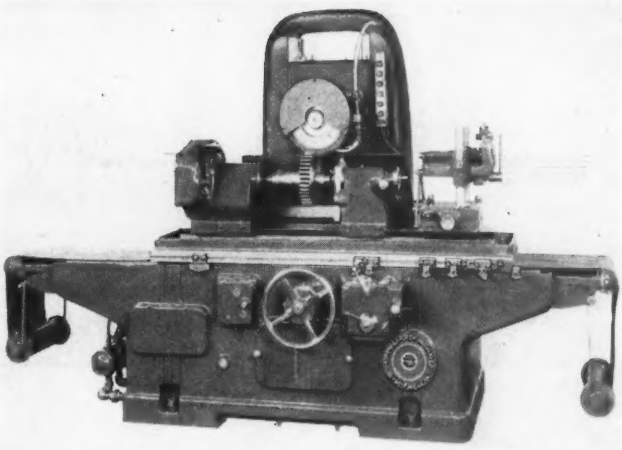
Work assembling, loading, aligning, clamping, and rivet nesting features can be built into the machine. Work is illuminated by built-in lamps. Tonnage adjustment and gage are positioned directly in front of the operator's eyes as is the oil level sight glass. Live or driving dies may be above or below. According to the manufacturer, a complete riveting stroke of all dies can be accomplished in less than two seconds.

The Hanna Electric-Hydraulic Riveting Press is available in capacities of from 10 to 100 tons.

"Red Ring" Gear Grinding Machine

Developed originally to meet needs for precision grinding of master gears and involute broaches in the plant of the National Broach & Machine Co., 5600 St. Jean, Detroit, Mich., the "Red Ring" Gear Grinding Machine shown herewith is said to have all the advantages of other grinders and to be without many of their disadvantages. The machine is exceptionally rigid, utilizing a "U"

"Red Ring" Gear Grinding Machine



type column, with wheel spindle mounted on long bearings. The spindle is integral with the motor rotor.

The spindle is adjustable up and down by means of a handwheel. A hydraulic counterbalance is said to remove all backlash from the leadscrew. Operation of the down feed against hydraulic pressure, the manufacturer states, eliminates possibility of the head sticking when small increments of down feed are desired.

The table slide is hydraulically reciprocated and automatically controlled through a feed box mounted on the front of the machine. Table speed is said to be controlled to a high degree of precision. A cam on the table slide provides force feed lubrication to the ways at each stroke. The combination V and flat ways are covered at all times by a canvas roll. The index head is furnished with either fully automatic or semi-automatic control, as desired. Semi-automatic control is stated to provide the greater accuracy.

For gear tooth work, a template control trimmer is provided which trims both sides of the grinding wheel simultaneously. The table feed box includes a dead stop which brings the wheel to trimming position so that the diamond points operate exactly in line with the center of the wheel. The radius trimmer is mounted in the tailstock. The diamond points are adjustable up and down and may be set with a micrometer.

For accessibility, both coolant and hydraulic pumps are located on the outside of the machine. Reservoirs are positioned inside the base.

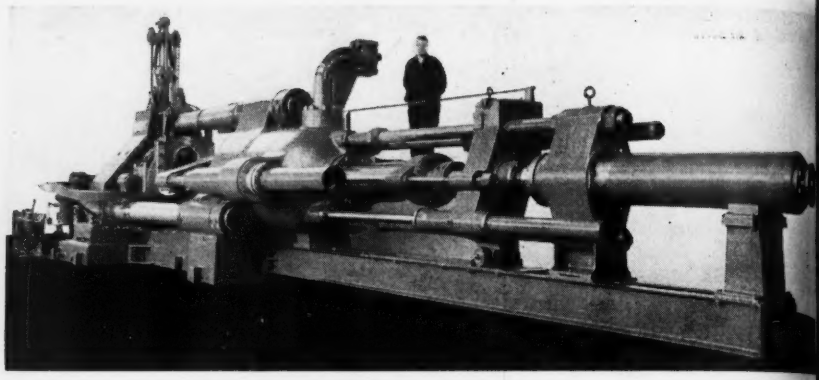
Farrel-Birmingham Extrusion Press

While the extrusion process has been applied to non-ferrous metals for 35 years, it is only during the past several years that this process has been successfully employed for the production of stainless steel, nickel alloy and ferrous rods, tubing and shapes. This advance, which appears likely to open new fields for special alloys, has been made possible by the development of the hydraulic extrusion press. A press of this type of 2,000 tons capacity, built by Farrel-Birmingham Company, Inc., Ansonia, Conn., is shown in the accompanying illustration.

The designers believe that with this new press, all of the currently known stainless steels and other special ferrous and non-ferrous alloys which do not work well by rolling, welding or piercing, can be extruded without difficulty.

The advantages of extrusion are well known. It is probably correct to say that any article which has been extruded from a billet has acquired a grain structure more free from faults than if it had been rolled. This change in structure is due to the fact that extrusion is a squeezing-compression process, while rolling and drawing is a stretching operation.

An advantage of the extrusion process is that extruded tubes of stainless steel, for instance, can easily be drawn

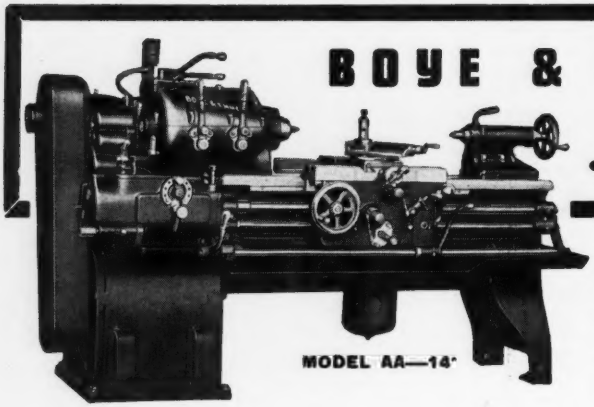


Farrel-Birmingham Extrusion Press

down to very small sizes. For example, it is possible to draw down extruded tubes to a final dimension of a few thousandths of an inch in diameter, such as are used for hypodermic needles, the final tubes having a perfect structure. This was not possible formerly, when the original tubes were produced by a piercing mill. Extruded tubes possess a first-class structure and in general are of a far higher quality than tubes manufactured by any other method.

With the new extrusion press aluminum alloys are extruded in numerous semi-finished shapes which are readily worked into final dimensions.

The billets to be extruded by the

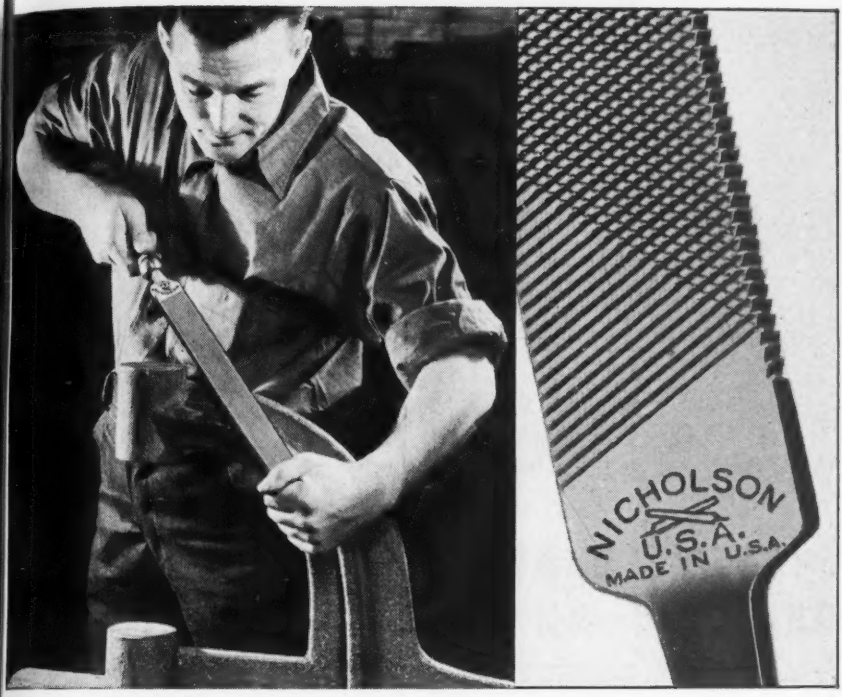


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Lathes

Forty years of specialized manufacture are behind this line of heavy duty lathes. Made in a full range of sizes—from 14" to 36"—each of outstanding power, accuracy, range and economy.

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CINCINNATI • OHIO



BETTER FOUNDRY FILES

NICHOLSON Files for every purpose, **is no empty phrase. With more than three thousand shapes, sizes and cuts, it definitely means that every Nicholson File is *The RIGHT file for the job.*** **. . . . Right in design, weight, cut, balance, "feel," hardness —and with each of these qualities so uniformly maintained that Nicholson can safely guarantee *Twelve perfect files in every dozen!***

Take foundry files: First developed for snagging castings, Nicholson Foundry Files are carefully designed for removing fins, sprues and other hard projections; for filing narrow edges and sharp corners of dies, etc.

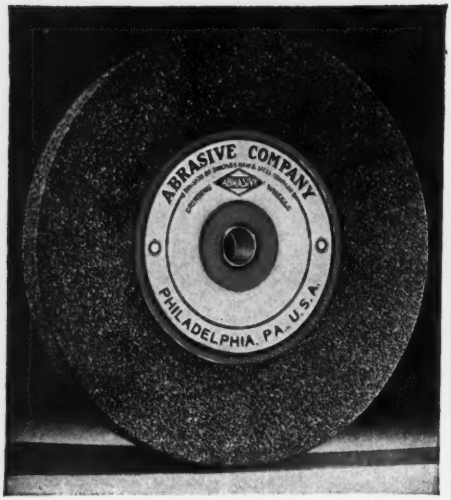
They're tough! They've extra-strong, rugged teeth; heavier set edges. Made to resist shelling off or breaking out, for fast stock removal . . . for long life and money saving! Regularly in bastard cut — Flat, Half-round, Round and Square — 8" to 18". Each file plainly stamped "Foundry" for ready identification. Order through your mill-supply house.

NICHOLSON FILE CO., Providence, R. I., U. S. A.
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NICHOLSON FILES

FOR EVERY PURPOSE

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MADE IN U.S.A.



ABRASIVE COMPANY
GRINDING WHEELS

Improve your grinding operations with the fast cutting action and long life of ABRASIVE COMPANY GRINDING WHEELS. They are unexcelled in quality and uniformity. They are furnished in two types:

Borolon **(aluminum oxide abrasive) vitrified bonded for grinding steel and materials of high tensile strength.**

Electrolon **(silicon carbide abrasive) vitrified bonded for grinding cast iron, brass, bronze, aluminum, stone, marble, granite and similar materials of low tensile strength.**

"ABRASIVE" Wheels are made in all sizes and shapes in grain and grade combinations best suited to your work. They are readily identified by their RED CIRCLE Wheel Blotters.

Write for New Catalog

ABRASIVE COMPANY
Division of Simonds Saw and Steel Co.
Tacony & Fraley Sts., Philadelphia, Pa.

press can be taken as rough cast billets coming from the foundry after being cut to the proper length. The skin of the billets, which is formed mostly by oxidation, remains as a thin shell in the container after extrusion, so the extruded product is formed of clean material only. This is particularly important in the manufacture of high-quality products.

Tubes and rods manufactured by this press are not only remarkably sound in structure but possess excellent metallurgical and physical properties and a good condition of surface, consequently the number of draws for finishing can be considerably reduced.

The amount of scrap—consisting of the thin shell of the billet and the discard—is very low, so the difference in weight of the billets charged into the container and of the extruded product is only about 89 to 10 per cent in the case of tubes, and about 10 to 12 per cent when manufacturing rods. The concentricity of the extruded tubes is well within the commercial limits, and provided that sound billets, uniformly heated, are extruded, it will be within plus or minus 5 per cent of the wall thickness. Hydraulic presses for the extrusion of metals are being built in several capacities.

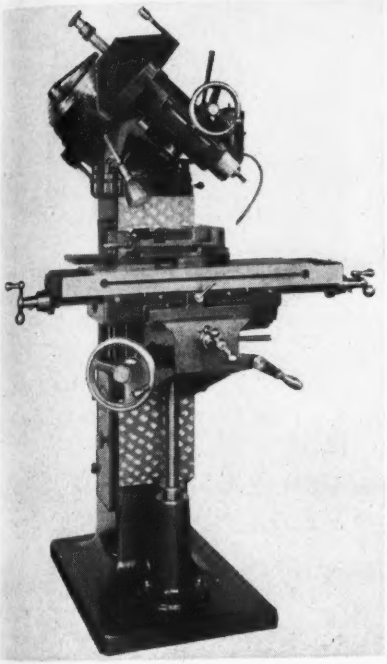
Millmaster No. 2½ Vertical Milling Machine

Illustrated herewith the Millmaster No. 2½ Vertical Milling Machine which is now being manufactured by the Midway Machine Co., 2324 University Ave., St. Paul, Minn. The machine is available in either a stationary or movable quill model. In the stationary quill model, the maximum overall height of the machine is 72 in., and in the movable quill model, the maximum overall height is 80 in. Base size of the machine is 22 in. wide x 34 in. long. The length of throat is 10½ in., and the distance from motor to spindle is 38 in. The machine weighs 1,600 lbs. net and approximately 1,740 lbs. crated for shipment.

The table is 9 in. wide x 34 in. long with a working size of 9 in. in width and 26 in. in length and a maximum vertical, longitudinal, and transverse feed of 30 in., 18 in., and 10 in. respectively. Adjustable stoplocks are provided for horizontal setting to pread-

justed position. All gibs are oversize, lubricated, and provided with hand lock levers.

The spindle, which is of chrome-nickel steel, is machined for a No. 9 B & S taper and has maximum capacity for a ¾-in. draw-in collet. End mill capacity is ⅛ to 3 in. The spindle has a swivel of 180 deg. or 7-in. outside diameter. Main spindle and spindle pulley bearings are preloaded ball bearings, duplex oversize.



Millmaster No. 2½ Vertical Milling Machine

Spindle speeds range from 275 to 4,300 r.p.m. By using two extra pulleys, 17 speeds ranging from 70 to 10,000 r.p.m. are available. With a center third pulley, 44 speeds can be obtained. The movable quill has a 5½-in. vertical travel and is equipped with a fast lever feed and slow worm drive with handwheel. Micrometer adjustment and hand lock lever are also provided for the quill.

The Millmaster No. 2½ Vertical Milling Machine is driven by means of a

SIMONDS
Red Blade
Molybdenum
HACK
SAWS

MAKE TOUGH CUTS EASY
•
. . . HOLD THEIR EDGES

Ask
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Fitchburg, Mass.

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Famous Family of
METAL CUTTING TOOLS

V-belt having six-step pulleys of machined cast aluminum alloy. A column vertical stop bar is supplied as standard equipment on the machine and is available with vernier for micrometer adjustment setting. The Millmaster is provided throughout with oil feed reservoir cups at all bearing surfaces and is finished in standard machine tool gray. Standard motor equipment includes a 1 h.p., three phase, 1,100 r.pm., 220-440 volt, 60 cycle, ball bearing, reversible motor. Motors in single phase or in other sizes, voltages, types, speeds, or capacities are available. A table power feed, simplified tailstock, and indexing headstock can be obtained on order.

Hammond Overhanging Spindle Polishing Lathe

An addition to the Rite-Speed polishing and buffing lathe line, to be known as the Model 10-ROH, is announced by Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo, Mich. This polishing lathe has an overhanging spindle of 12½ in. from the lower front of base. According to the manufacturer, the lathe is especially desirable on large, bulky pieces.

Standard equipment with the Hammond Overhanging Spindle Lathe in



Hammond Overhanging Spindle Polishing Lathe

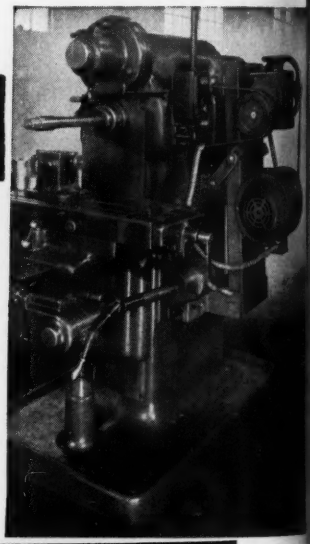
cludes a spindle lock for holding spindle when changing wheels, a combination switch and brake which shuts off motor and instantly stops the revolving spin-

Modernize with

FLEXOID SPEED CONTROL

REVOLUTIONARY FOUR AND EIGHT SPEED TRANSMISSIONS

The FlexoiD 4 and 8 SPeed Control units will give your present line shaft driven machines all the advantages of new individually driven machines. Units are sturdy, compact and foolproof, with adjustments provided for input and output drives. A single handwheel control (at a remote position if desired) changes all speeds. All gears and shafts are alloy hardened steel, running in S.K.F. ball bearings. No pilot bearings or bronze bushings to wear out. Write for descriptive data and prices.

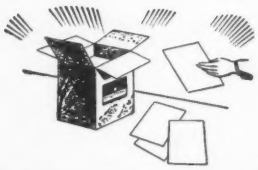


The Smith Power Transmission Co.

1545 EAST 23rd ST., CLEVELAND, OHIO

Tossed in the teeth of a Sleet Storm!





FRESH AND DRY ON DELIVERY!

The sleet storm that howled down the Atlantic Coast in February caught up with this interstate truck near midnight. Trees sagged and snapped . . . the mounting gale tore at the slithering trailer. The driver knew he couldn't hold the glassy road much longer. Then . . . a downhill curve . . . a sickening slide . . . and a crash! The driver ran for help . . .

An hour later, his searching flashlight showed part of his load frozen to the ice-coated road. Two cartons, tossed out by the impact. "CONTENTS SANDPAPER," he read. Sandpaper — a sucker for moisture . . . worthless if bent or broken. He shrugged, tossed the icy cartons over the tailboard anyhow, and went around to attach the tow-chain . . .

Thanks to the truckers' creed that shipments must go through, those cartons were delivered the next day. Opened with misgivings . . . but their contents were 100% usable! For these were the famous AP "Masterpak" containers, designed to protect our coated abrasives against damage from handling and the elements!

Your shipment of AP Coated Abrasives may not come through a sleet storm. But it's mighty comforting to know you'll get it factory-fresh, every sheet usable, without a red cent of extra cost to you! Abrasive Products, Inc., 507 Pearl Street, South Braintree, Massachusetts.

WE PAY THE BILL IF THE RIGHT AP ABRASIVE DOESN'T CUT YOUR COSTS

Just send for a ream or 50 yard roll of the AP paper or cloth suited to your needs. Use up to half of it. If it doesn't cut your finishing costs, return the unused half to us and *no bill will be sent.* Do it now!

ABRASIVE PRODUCTS

SOUTH BRAINTREE MASSACHUSETTS

JEWELOX • JEWEL EMERY • JEWEL GARNET — JEWELITE • JEWEL FLINT • NEW PROCESS

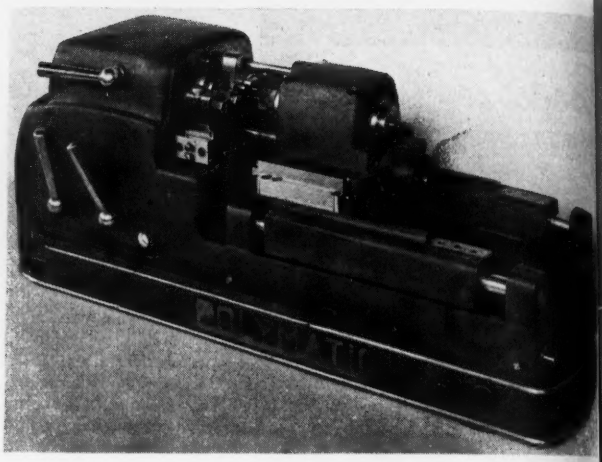
INC.

dle, and an automatic motor starter. Motors up to 10 h.p. with multi-V belt drive mounted inside the base are also furnished.

Polymatic High Speed Wire Forming and Cut-Off Machine

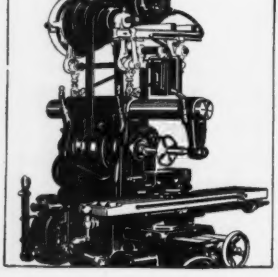
To aid in the high speed production of small parts of the type that are produced on precision screw maches, Unit Machinery Co., Rockford, Ill., has brought out the Polymatic High Speed Wire Forming and Cut-Off Machine illustrated herewith. The machine is intended for the following operations or combination of operations; stock feed to fixed or swinging stop, form and cut off with two cross slide tools, and one or two end operations. The end operations may be threading, drilling, box turning, or turning with a swing tool and live pick-up.

The machine is equipped with a live pick-up spindle which is geared to the main spindle, the two revolving in perfect unison. The part is chucked by a collet in the spindle nose while being cut off; thus the premature breaking off with resultant burr is prevented. As the collet opens in the pick-up spindle, the part is pushed through a tube inside the spindle. Finished parts drop at the back end of the spindle, clean and entirely separated from the chips.



Polymatic High Speed Wire Forming and Cut-Off Machine

The machine is available in two models; No. 01 which handles wire stock to 5/32-in. diameter, and No. 11 which handles up to ¼-in. diameter stock. Both models are available either self-contained on a streamlined base or in a bench-type model. The machines are motor driven with pick-off gears to effect changes in spindle speeds and feeds. The spindle speed of the smaller model is up to 15,000 r.p.m. and the larger model is to 10,000 r.p.m. Anti-friction mountings of spindle and other revolving parts result in high precision and low maintenance cost. All moving parts are lubricated by cascade or drip lubrication from an oil circulating system actuated by a built-in pump. Floor space required, exclusive of stock tube, is 10 x 30 in. for the small machine and 16 x 40 in. for the large machine.



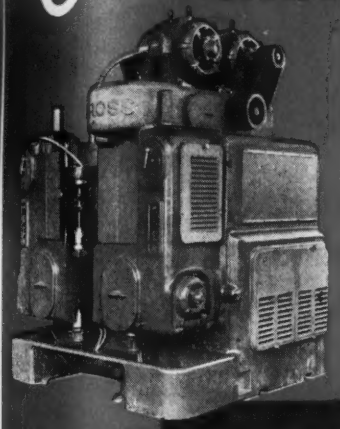
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Modernize your present cone pulley machine tools. Equip them with Remco Drives. Apply power direct, to end production "bottle-necks"—speed-up output. Remco adjustable motor rails take any motor—new or USED—of reasonable size. Saving on belting alone very often pays for a complete Remco installation. Write! Remco Products Corp., State and Hay Streets, York, Pa.

REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

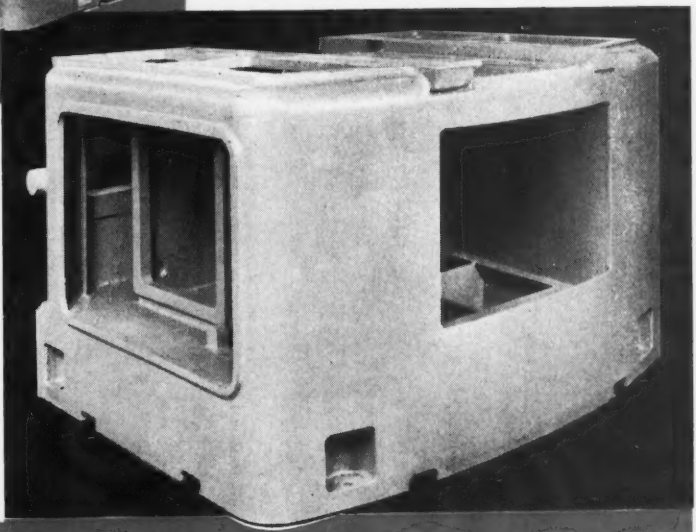
Welded STEEL Machine BASES



. . . *smoother Finished Appearance indicates SUPERIOR Workmanship*

Accuracy and finished appearance are the only basis upon which the quality of workmanship in Welded Steel Machine Bases can be compared. Alert machine manufacturers were immediately attracted by the unusually fine finished appearance of frames and bases turned out by The R. C. Mahon Company—because, finer finished appearance indicates greater accuracy and superior workmanship on the part of the craftsmen engaged in the fabrication of these bases which become the foundation of your product. If you demand machine bases of exceptionally fine finished appearance and accuracy—bases upon which you will be proud to place your company's name, send your blue prints to Mahon for quotations.

THE R. C. MAHON COMPANY
Detroit, Michigan
Manufacturers of Machine Bases and Many Other Steel Products



Reproduced at the right is an unretouched photograph of a Welded Steel Machine Base produced by Mahon for the Cross Gear and Machine Co., Detroit, Mich. Above is the No. 15 "MilLathe" for which the base was built. This machine, a standard production machine tool, was developed by Cross Gear and Machine Co. for turn milling crank shafts to a complete finish.

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MECHANIZE YOUR LIFTING JOBS!



Install Portable Electric "Budgit" Hoists at all places where lifting is done manually or with chain blocks . . . They speed the work, reduce waiting time of men and machines, and promote efficiency . . . They are the first step towards mass production methods!

"Budgit" Hoists come in sizes to lift loads up to 250, 500, 1000, and 2000 pounds with speeds to suit today's tempo . . . You can afford "Budgits"! Prices start at $119. and there's nothing else to buy . . . You simply Hang up, Plug into the nearest electric socket and use!

Send for catalog containing complete information, also "Time Savings Calculator" that shows savings they earn.

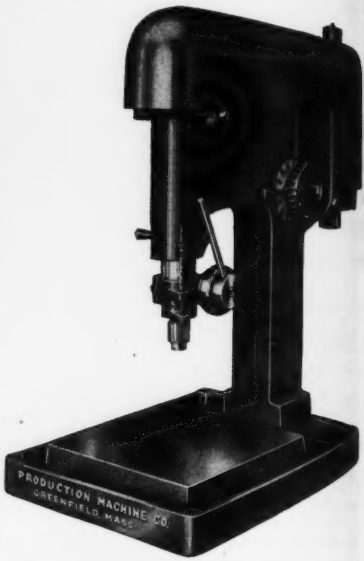
SHAW-BOX CRANE & HOIST DIVISION
MANNING, MAXWELL & MOORE, INC.
440 BROADWAY • MUSKEGON, MICHIGAN

Makers of all types and sizes of Electric and Hand Operated Cranes and Electric Hoists . . . **Send all your crane and hoist inquiries to "Shaw-Box"!**

Portable Electric **"BUDGIT" HOISTS**

Reed Type No. 25 Sensitive Bench Drill

The Production Machine Co., Greenfield, Mass., has brought out a streamline, high speed, sensitive bench drill designated as the Type No. 25—a development of the Reed line of sensitive drills which the Production Machine Co.



Reed Type No. 25 Sensitive Bench Drill

is now building. The No. 25 bench drill is said to be definitely new in design of unusual strength, and unique in its simplicity. According to the manufacturer, it is a production tool for accurate work; an all-purpose machine capable of unusual speed and adaptable to a wide variety of drilling operations.

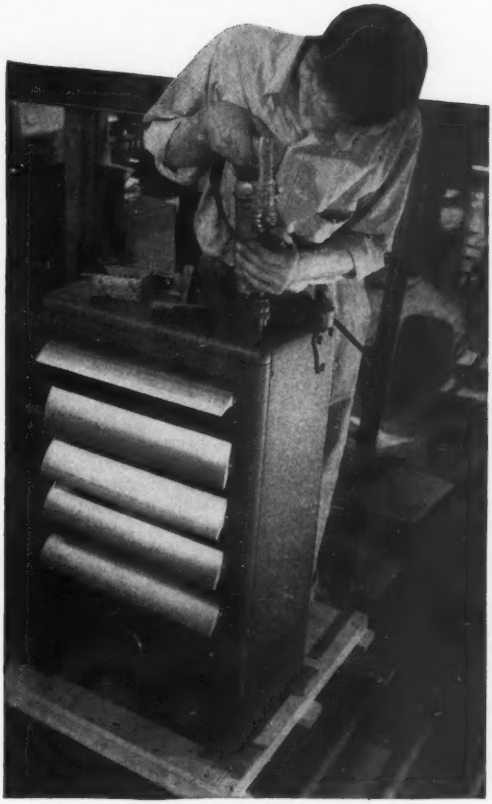
The Reed Type No. 25 Sensitive Bench Drill embodies a variable speed drive with an infinite spindle speed range of from 2,000 to 10,000 r.p.m., speeds being instantly available by the turning of a handwheel located on the side of the frame of the machine. Spindle speeds are indicated on a graduated disc. All moving parts of the machine except the drill chuck are completely enclosed.

Specifications and capacities of the Type No. 25 machine are as follows: capacity, center of spindle to column, 7 in.; maximum distance, chuck nose to

The AUTOMATIC TAPPER

with the

ADJUSTABLE CLUTCH



Automatic in action, with an adjustable clutch—an exclusive feature — CP Universal Tappers cut costs on production lines:

- A slight pressure gives right-hand rotation; backing the tool away from the work reverses the rotation.
- The adjustable clutch — regulated through a thumbscrew on the gear case — operates only when tap encounters blind hole or other obstruction, up to predetermined overload adjustment.

For complete data on CP Universal Tappers write for Catalog 899.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 6 EAST 44th STREET, NEW YORK, N. Y.

SALES OFFICES AND SERVICE STATIONS THROUGHOUT THE WORLD

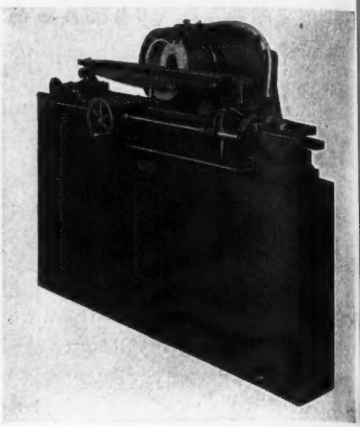
CP UNIVERSAL ELECTRIC TOOLS

DRILLS • SCREW DRIVERS • NUT RUNNERS • TAPPERS • GRINDERS • SANDERS

table, 6⅜ in.; range adjustment of sliding head, 3 in.; travel of spindle with depth stop, 3 in.; without depth stop, 3¾ in.; working surface of table, 11 x 11 in; speeds, standard, infinite range between 2,000 and 10,000 r.p.m.; motor, ½ h.p., 110 volt, 1 phase, 60 cycle. 3,450 r.p.m.; drill sizes, No. 70 to ¼ in.; spindle diameter, least, 1/16 in.; spindle sleeve diameter, 2⅛ in.; spindle quill diameter, 1⅝ in.; chuck nose range, 6 in.; chuck capacity, 0 to ¼ in.; height overall, 27 in.; bench space, 15 x 32¼ in.; weight of machine with ½ h.p. motor, 195 lbs.; weight less motor. 170¾ pounds.

Rogers Cabinet Base Knife Grinder Type B26-60

Illustrated herewith is the Rogers Cabinet Base Knife Grinder Type B26-60 which is now being manufactured by Samuel C. Rogers & Co., 191-205 Dutton Ave., Buffalo, N. Y. The grinder is equipped with a heavy box type bed and carriage and heavy ribbed knife bar, and is claimed to give satisfactory grinding service for a great variety of knives including woodworking, hog barker, paper cutting knives and light



Rogers Cabinet Base Knife Grinder Type B26-60

shear blades within the range of the machine.

One of the outstanding features of the unit is the long cabinet type of

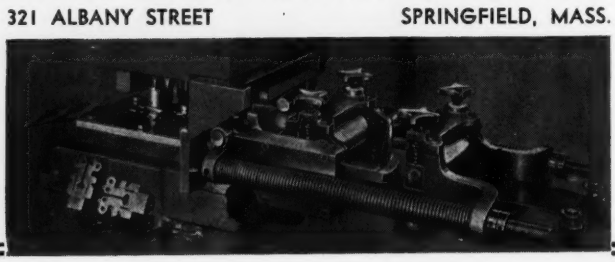
NEW PRODUCTION FACILITIES ASSURE PROMPT DELIVERY

The greatly increased production facilities of our new plant assure you of prompt service and delivery on all DICKERMAN Die Feeds and Hitch Feeds.

We'll be glad to send you complete information on these money-saving Feeds, designed for quick set-ups on short or long runs. Write today.

H. E. DICKERMAN MFG. CO.

321 ALBANY STREET SPRINGFIELD, MASS.





Tightening up

Impetus of rearmament programs presses on to take up the slack in production, and where do you find the "slack" so recurrent as in equipment tie-ups, down-time of machines, lost time of mechanics and operators?

The tightening up of loose operating practices implies tightening up of machine assemblies and adjustments of all kinds — specifically by use of Hollow Screws that HOLD above all others!

It's hardly needful to *name* the screws, in view of the fact that the *same* make of screws has held the Quality market for 30 years, — some of which decidedly were years of "tightening up".

Cold-drawn, "pressur-formd", scientifically heat-treated, precision-threaded, — ALLEN hollow set and cap screws are steeled to the new schedules and specified with the new incentive of PREPAREDNESS.

Your local Allen Distributor will oblige with samples and SERVICE.

THE ALLEN MANUFACTURING COMPANY
HARTFORD, CONNECTICUT, U.S.A.

LOW PRICED *for precision work*



IMPROVED
Vernon
11" PRECISION
Shaper

Designed for speed, accuracy and versatility, the Vernon 11" Shaper will handle work usually accomplished only by machines costing several hundred dollars more.

OUTSTANDING FEATURES:

1. *Variable drive provides infinite speeds ranging from 50 to 150 strokes per minute with no changing of belts or pulleys.*
2. *Helical gear and pinion assure maximum smoothness and power.*
3. *Universal table and 7" swivel vise with steel jaws.*
4. *Front-end support for absolutely vibrationless rigidity.*

The Vernon 11" Shaper has automatic, easily adjustable cross feed; enclosed anti-friction thrust bearings for long life; hand-scraped ways; and alloy rocker arm. Motor, ½ h.p., 1,750 r.p.m., 60 cy. **Bench model as illustrated or mounted on floor pedestal with fully enclosed variable drive.** Ask for Bulletin.

The Vernon Line of

HORIZONTAL MILLING MACHINES, COMBINATION VERTICAL MILLING MACHINES & JIG BORERS, & 11" SHAPERS

MACHINERY MANUFACTURING CO.
3636 IRVING STREET, VERNON, LOS ANGELES, CALIFORNIA

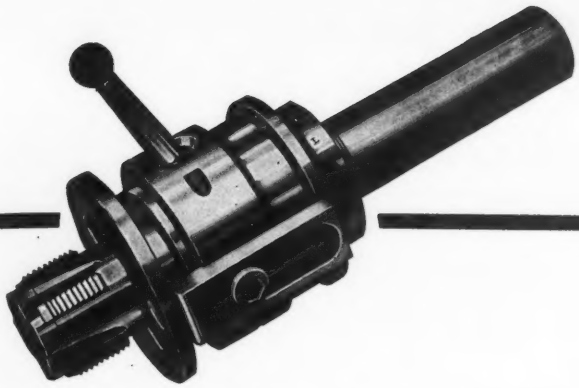
base which extends the entire length of the bed, thereby eliminating the use of extra end standards. The transmission is of the straight and cross belt and shifting lever type, so designed as to provide maximum smoothness of traverse and shifting, thus insuring accurately ground cutting edge of knife.

The Rogers Cabinet Base Knife Grinder Type B26-60 is adjustable for grinding flat or concave bevels, is equipped with full automatic cross feed, 10-in. cup grinding wheel, self-contained wet grinding attachment, and can be adjusted for various lengths of knives up to the capacity of the machine. For motor drive, a ball bearing 1½-h.p. motor is provided. For belt driven machines, the tight and loose pulleys are 8 in. in diameter and should run 1,200 r.p.m. The table speed is at the rate of about 30 ft. per minute with a grinding speed of approximately 3,600 s.f.p.m. Standard equipment of the Type B26-60 unit includes 10-in. cup grinding wheel, belts, wrenches, and emery wheel dresser.

Catskill Model R Power Reaming Machine

Shown in the illustration herewith is the Catskill Model R Power Reaming Machine which is now being built by Catskill Metal Works, Inc., Catskill, N. Y. The machine is a small compact production tool that is said to be ideal for removing burrs after keyseating or tapping of set screw holes. By using this machine, finish reaming can be speeded up with increased accuracy and all tedious hand reaming eliminated. The Model R unit is designed to accommodate standard taper shank reamers which can instantly be changed, thus making the unit adaptable for odd lot or single piece work.

The Catskill Model R Power Reaming Machine is built so that it may be mounted on a bench or located at the exact point of the last operation. Three output speeds are available; 95, 120, and 165 r.p.m. Speeds are easily changed through a 3-step V pulley. The machine has a capacity for reamers up to 1⅞ in. The unit is powered by means of a hinge mounted, ⅓ h.p., 110-220-volt, 60 cycle, single phase capacitor motor driving a single worm reduction gear running in oil. The worm is hardened and ground; the gear is of bronze.



COLLAPSING TAPS

FOR internal threading the Geometric Class S Tap saves money, time and trouble — and produces better threads. Solid, sturdy chasers, rigidly supported in the body of the tool, withstand heavy strains; yet ample chip space insures smooth cutting. With the positive trip, the tap cannot jam nor fail to open. The fine workmanship of a precision-built tool brings clean, accurate screw threads. Shall we send you a catalog?

GEOMETRIC

TOOL COMPANY

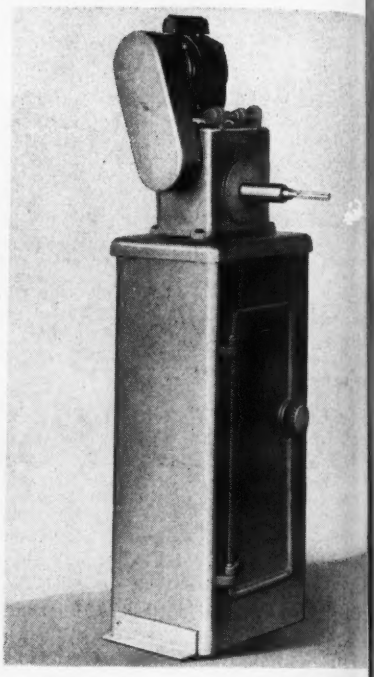
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Oil-Hole Drills Work Perfectly with Universal Collet Chucks..



Universal Collet Chucks grip shank or flutes of drills (plain or Oil-Hole), end mills, key-way cutters, etc. as strong as solid steel.

UNIVERSAL
Engineering Company
Frankenmuth, Mich.



Catskill Model R Power Reaming Machine

Bronze bearings are used throughout the case. Overall dimensions of the machine are 14½ x 14½ x 18½ in. high. Net weight, 95 pounds.

Cleveland Special Cranes

Built for the Portsmouth Navy Yard, Cleveland Crane & Engineering Co., Wickliffe, Ohio, has designed two special cranes, one of which is illustrated herewith. The crane has a cantilever extension which makes it possible for the trolley to go beyond the crane runway and to convey loads into the adjacent bay. The crane bridge is underslung so as to permit the trolley, when traveling into the next bay, to clear under the runway girder. This type of construction is said to enable material to be transferred easily from one bay to the other without requiring any handling between.

The cranes are of all-welded steel con-

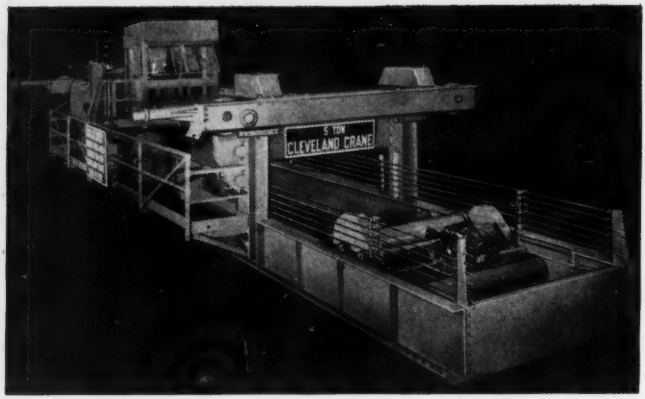
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BROACHES AND FORM TOOLS



Patents Pending

NATIONAL BROACH AND MACHINE CO.
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Cleveland Special Crane

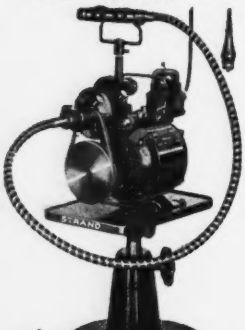
approximately ft. Vertical trav of hook is 86 f and speeds ar hoisting, 40 ft. p minute; trolley, ft. per minute, a bridge, 350 ft. p minute.

struction throughout with all bearings of the anti-friction type. Spring-type bumpers are provided for trolley and one side of bridge. Gear cases are oil tight, and bridge wheels, gears, and pinions are of tool steel. The cranes are operated from a closed-type cab mounted on the end of the bridge opposite the bridge extension. The capacity of each special crane is 5 tons and the span is

Vernon No. 0 Hand Miller

A recent addition to the Vernon lin of precision milling machines manufac tured by Machinery Manufacturing Co. 3636 Irving St., Vernon, Los Angeles Cal., is the Vernon No. 0 Hand Mille for high speed milling of small parts With hand lever operated rack and pin ion feed, the Vernon No. 0 is a pre

TYPE RFM4—¼ H.P.



Strand

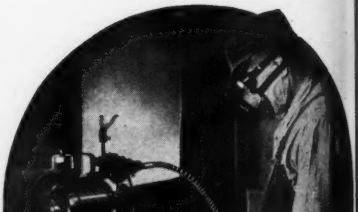
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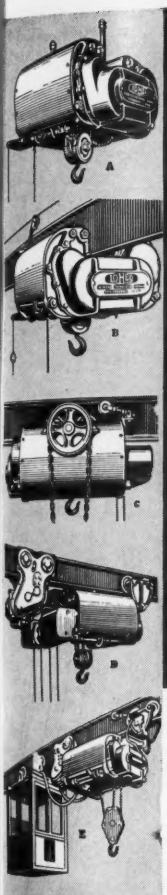
RUBBER DRUM SANDING



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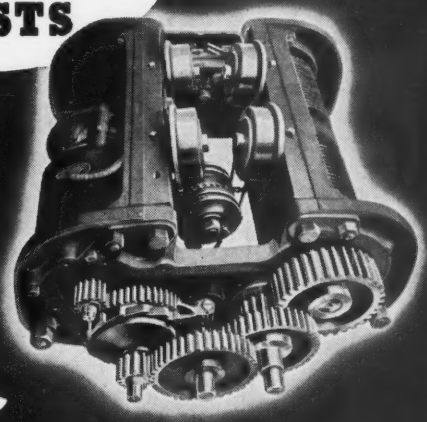
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A—Belt Suspension Type.
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CAPACITIES FROM ½ to 12 TONS

A-E-CO

LO-HED *Time-tested* HOISTS



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A hoist and the track on which it travels are partners for your profit. One should fit the other. That does not mean both must be made by the same manufacturer any more than an automobile tire must be made by an automobile manufacturer.

The Lo-Hed Hoist is built to run on standard I-beams or, with very slight modifications, on any track system. We make neither I-beams nor track systems. We believe that your ability to buy a hoist independent of the track is an advantage in shopping, in making track changes, or in switching the hoist location.

Get this time-tested advantage. While you're about it, look into all other time-tested features of the Lo-Hed illustrated in the open-view of the Lo-Hed Hoist on this page: Heavy duty hoist type motor, automatic lowering brake, anti-friction bearings, stub tooth spur gears, plow-steel cable, 100% positive automatic upper limit stop, dust and moisture-proof controller (Construction varies slightly for classes of Lo-Heds.)

Investigate Lo-Hed time-tested construction. Write today for the complete Lo-Hed Catalog, using the convenient coupon shown below.

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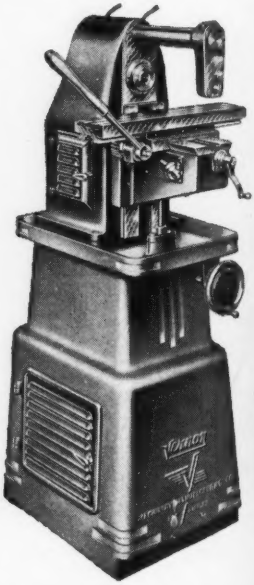
Compare Butterfield Taps with other taps for accurate threads and long life.

The difference will reveal the superiority of Butterfield Taps and their profit possibilities. You get more "thread mileage" per tap with Butterfields.

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cision machine tool designed to pro-
vide the accuracy and sturdiness re-
quired for the modern production de-
partment.

Two standard speed ranges are avail-
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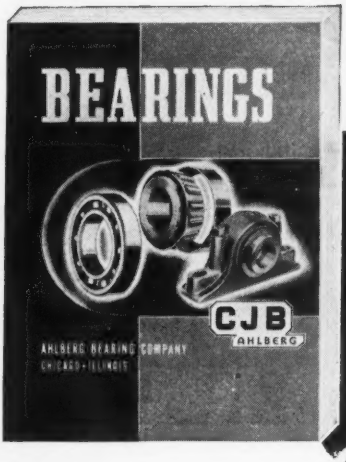
Vernon No. 0 Hand Miller

ranges is said to provide correct spin-
dle speeds for every job. The ground
spindle which is of heat-treated steel
is mounted on Timken tapered roller
bearings. The taper in the spindle is
No. 9 Brown & Sharpe. Power for the
No. 0 unit is provided by a ½-h.p.
1,750 r.p.m. motor operating at 60 cy-
cles. For continuous high speed opera-
tion, a ¾-h.p. motor is recommended.
Net weight of the machine is approxi-
mately 650 lbs. and the overall height is
58 inches.

Mahr Center Fire Rotary Forging and Heat Treating Furnace

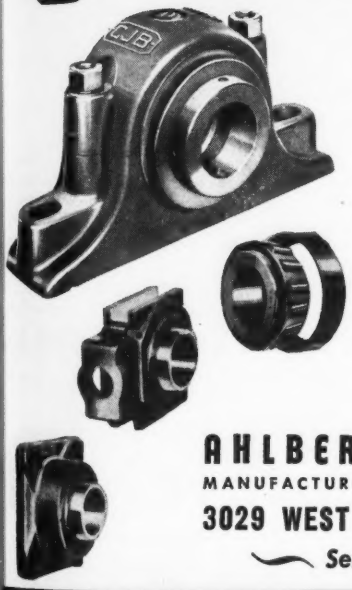
Illustrated herewith is the Mahr Cen-
ter Fire Rotary Forging and Heat Treat-
ing Furnace which has been develope

Just off the Press!



Write for your copy!





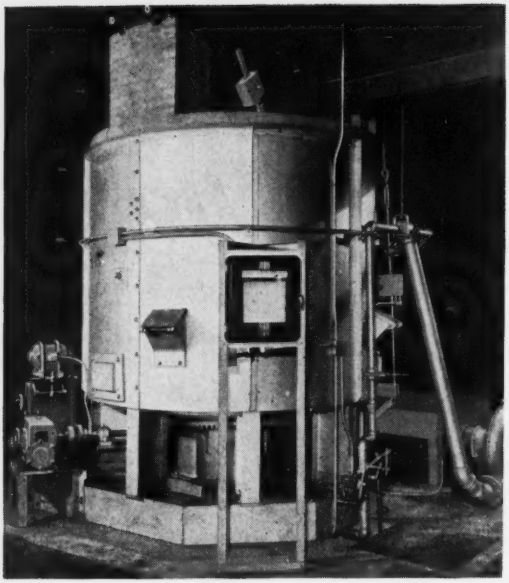
THIS NEW CATALOG contains so much usable data on the proper selection and maintenance of anti-friction bearings that we think every executive, engineer and maintenance man will value it, no matter what bearings he uses.

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Mahr Center Fire Rotary Forg
and Heat Treating Furnace

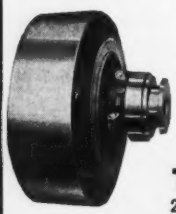
by the Mahr Mfg. Co., Division of Diamond Iron Works, Inc., Minneapolis, Minn. The furnace features primarily a single burner center firing principle. The burner, located at the bottom of the hearth, fires up through a long combustion cone of special design which, it is claimed, insures that the products of combustion come into equilibrium with themselves prior to coming in contact with the steel, thereby minimizing scale and decarburization. The Mahr center firing principle is also said to provide a furnace free from cold spots even at the furnace door where a cold spot usually exists. The single burner feature is said to assure close uniform control over the furnace atmosphe Positive pressure within t furnace is maintained by a automatic Vent-O-Matic sta damper.

The rotary table is driv from a variable speed tra mission. The furnace equipped with an improv type of sand seal having fl chambers for maintaining sand depth. A special type of door equipp with an air curtain protects the opera from heat.

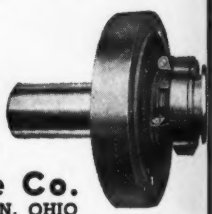
The Mahr Center Fire Rotary Fur ing and Heat Treating Furnace can equipped with full automatic temper ture controls and also with an indivi ual low pressure blower so as to ma it a self-contained unit. Heavily ins lated throughout with quality materi and supported by rugged steel str tures, the furnace is manufactured hearth diameters of from 4 to 9 f operating on either oil or gas fired temperatures of from 1,400 to 2,500 de Fahrenheit.

"EDGEMONT" SERVICE TESTED FRICTION CLUTCHES

DISC "TYPE SF"

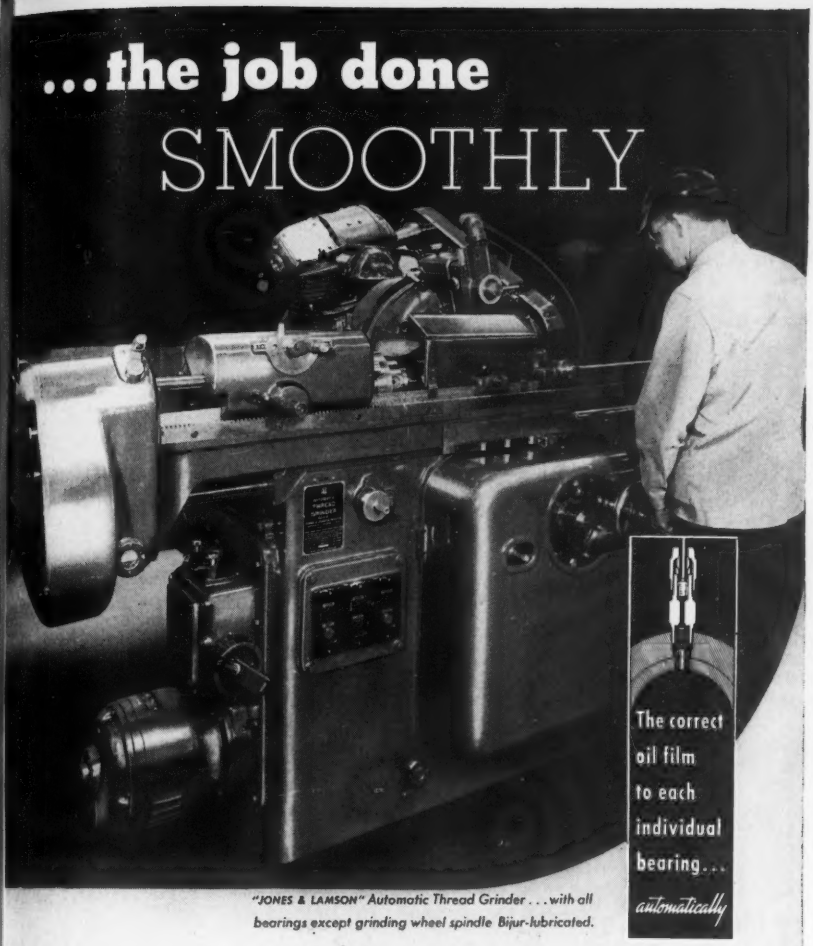


Look into those troublesome clutch drives, then send in shaft size, horsepower requirements, and type of drive. Our recommended size of "Type SF" Disc Clutch will solve your problems for good. Send data now for quotation. Circular on request.



The Edgemont Machine Co.
2100 HOME AVENUE DAYTON, OHIO

...the job done SMOOTHLY



"JONES & LAMSON" Automotic Thread Grinder . . . with all bearings except grinding wheel spindle Bijur-lubricated.

● **No time is lost from productive work . . . a BIJUR-equipped machine oils itself, while running! Metered oil-feed—the correct oil-film needed by each individual bearing—is supplied automatically. The efficiency of operator and machine is raised . . . precision standards are held . . . maintenance is reduced to a minimum . . . production stepped up!**

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BIJUR

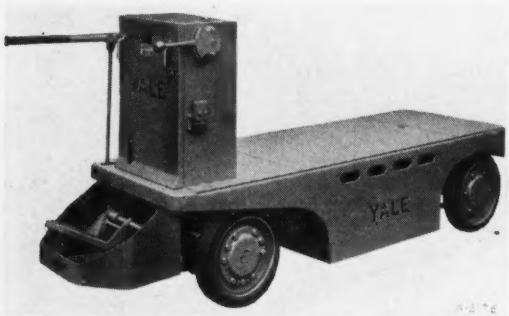
AUTOMATICALLY *Correct* LUBRICATION

1385

Yale KM-26 Load Carrying Truck

The Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia, Pa., announces the addition of a truck of the load carrier type to its line of electric industrial trucks. Designated as the KM-26, the truck has a capacity of 3,000 lbs. and is designed to carry all kinds of miscellaneous items. The unit may be loaded by hand, chain hoist, electric hoist, overhead crane, or ship's tackle.

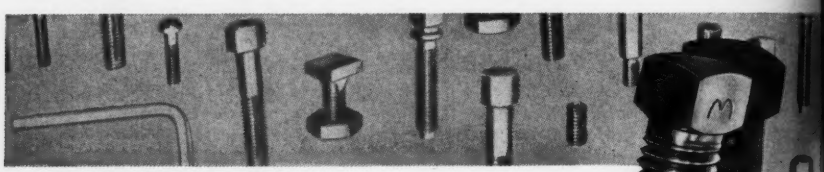
Small and compact, the Yale KM-26 truck features a rugged frame of welded steel plate for great strength with minimum truck weight, consequently making the unit particularly useful for transporting loads over gangplanks, floors, and in elevators of limited capacity. In addition, a four-wheel steer and small overall dimensions make the truck excellent for use in narrow aisles and other congested quarters. For the operator's safety, the control platform is protected by a streamlined bumper. Cushioned foot pedals provide comfort to the operator while the truck is in motion.



Yale KM-26 Load Carrying Truck

Esico Soldering Machine

Electric Soldering Iron Co., Inc., Deep River, Conn., is now manufacturing the Esico Soldering Machine shown in the illustration. The machine is available

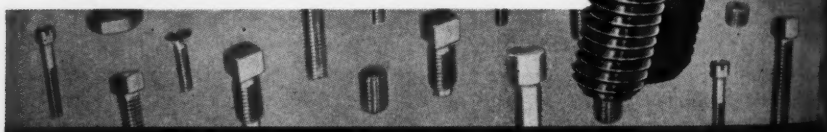


Try MAC-IT Alloy Steel Square Head Set Screws

Here's three times the gripping power of the same diameter hollow set screw! Where machines take terrific punishment, Mac-it square head sets are used because they offer amazing resistance to upsetting of the points and breakage. It's Mac-its for tough jobs.

The Mac-it line gives you 16 standard items, all milled from solid bars of Mac-it special alloy steel, and then heat treated.

Write for your copy of the new Mac-It Catalog on the only complete line of heat treated, alloy steel screws! 4



THE STRONG, CARLISLE & HAMMOND COMPANY
1392 West Third St., Cleveland · Ohio

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SKILSAW
½ in. SPECIAL DUTY DRILL

100% ANTI-FRICTION BEARING CONSTRUCTION FOR ONLY . . .

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WEIGHS ONLY **8 LBS!**





LOOK at these features and you will decide to BUY! Compact, modern die-cast body, helical-cut gears for smooth performance. 2-pole safety switch. Every moving shaft mounted on a friction-free ball or needle-roller bearing. Powerful Universal motor for fast drilling.

The new SKILSAW Model 80 DRILL *belongs in your plant . . . because it is the biggest drill value* on the market today! Be sure to ask for a demonstration.

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PORTABLE ELECTRIC TOOLS

SEE YOUR DISTRIBUTOR ...he will gladly demonstrate how SKILSAW TOOLS will save you money

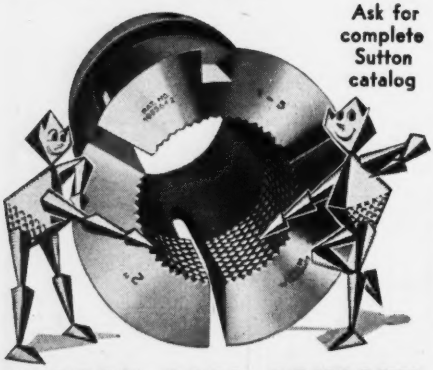


WINS THE PENNANT

GET ready for your big series by putting Sutton DIAMOND-GRIP Collets on your screw machine line-up. Their surer grip under less tension eliminates the chance of slippage spoiling your score . . . And don't overlook the delivery power of Sutton Feed Fingers. They are perfect teammates for Sutton DIAMOND-GRIP Collets.

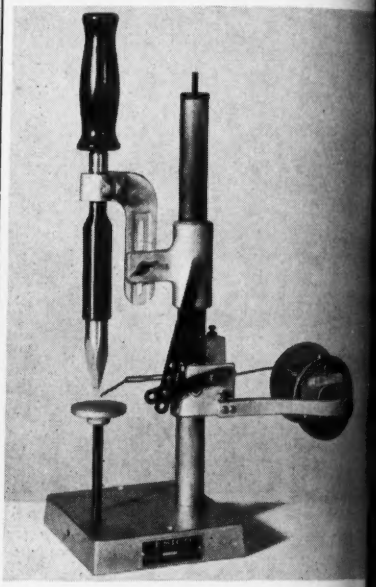
Sutton DIAMOND-GRIP Collets

Ask for complete Sutton catalog



SUTTON TOOL COMPANY
2895 W. Grand Blvd., Detroit, Mich.
Accessories for Screw Machines

in two models, F and N. The Model unit is operated by means of a trea which advances the soldering i straight downward. Solder is fed f ward as the iron returns from the wor Feeding of the solder may be exac regulated by adjustment of a pawl lev which actuates the feeding gears, a also by the diameter of the solder. S der up to ⅛-in. diameter can be us



Esico Soldering Machine

The Model F machine is equipped wi a feed tube which can be adjusted guide solder to the desired point. C tact of the soldering iron tip with wo is cushioned due to spring suspensio The Model F unit is designed to a commodate the average industrial i and is said to be ideal for work whe both hands are required and where s der cannot be hand applied. Shippi weight, 13 pounds.

The Esico Model N Soldering Mach is identical with the Model F unit e cept that it does not have the sol feeding mechanism. This machine said to be ideal for jobs where b hands are required for handling wo but where one hand can be relieved apply solder by hand. Shipping weig of the Model N is 11¼ pounds.

Bridgeport



TURRET MILLING MACHINE

Flexibility
Rigidity
Unparalleled
Range

•

AN outstanding product weighing 1600 lbs. with unusual range for large tool and fixture work yet extremely sensitive for fine milling on molding dies.

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Also, high speed milling attachments for all makes of milling machines.

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Write for further details.

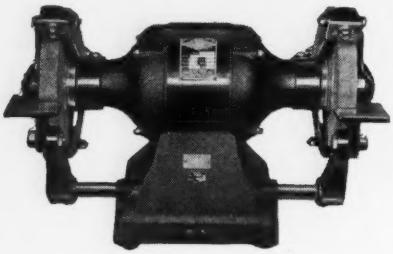
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BRIDGEPORT MACHINES, INC.

REMER STREET · BRIDGEPORT, CONN.

"Thor" Electric Bench Grinders

Ruggedly constructed for all-around service in grinding, buffing, and wire wheel work, three "Thor" Electric Bench Grinders are announced by the



"Thor" Electric Bench Grinder

Independent Pneumatic Tool Co., 604 W. Jackson Blvd., Chicago, Ill. Available in 6-in. light duty (B-66), 6-in. heavy duty (B-6), and 7-in. heavy duty (B-7) sizes, the grinders are equipped with motors that are said to be completely enclosed, cool and quiet running, and free from vibration. Ball bearings are oversize, dust-tight, and are said to require greasing attention only about once a year. All sizes of grinders are provided with adjustable tool rests and are arranged so that safety glass eye-shields can be attached. The wheel guards are extra heavy and on size B-6 and B-7 units are of the enclosed type with chutes.

The size B-66 and B-6 grinders are of the split-phase start, induction-run type, and the B-7 unit is of the capacitor-start, capacitor-run type, with oil-filled condenser in base. The latter type grinder, having no centrifugal starting switch, commutator, or brushes, is best adapted to heavy duty service and is said to withstand adverse conditions without burning out.

Boice-Crane 5/8-In. Capacity "Helmet-Head" Drill Presses

The Boice-Crane Co., 1729 Norwood Ave., Toledo, Ohio, announces the addition of several new models to its line of 5/8-in. capacity "Helmet-Head" drill presses with completely enclosed drive.



is the essence of PREPAREDNESS

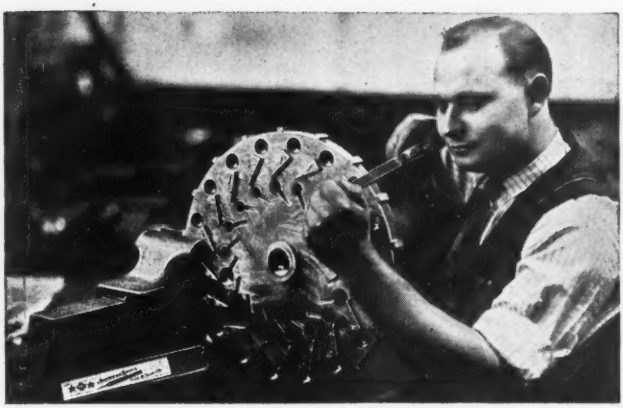
Our ability to keep peace in this hemisphere at least, depends largely on how soon we can carry out our National Defense Program. The first step, of course, is the matter of tooling up for mass production of war equipment. Anything that can be done to speed this important phase of Industrial Preparedness is vital to our safety.

For some years CERROMATRIX, the low-temperature-melting alloy that expands slightly on solidifying, has made it possible for die makers in many well-known metal-working plants to simplify the intricacies of die design and production and to reduce — enormously in some cases — the amount of time required to make a die. It's well worth your looking into at this time. Send for our new free Cerromatrix Manual.

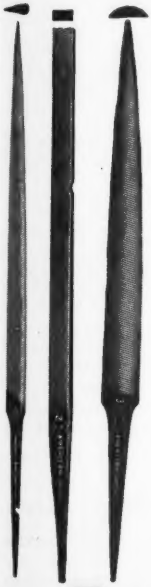
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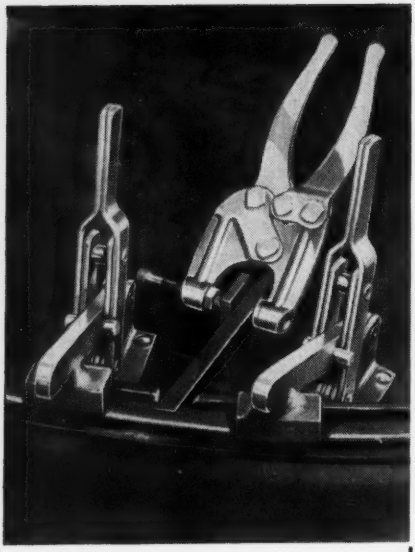
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To hold parts in production fixtures as for welding, drilling, reaming, machining or assembly operations use the quick-acting De-Sta-Co Clamps and Pliers. Complete line, all sizes. Send for Bulletin No. 40—illustrates clamps, gives dimensions, suggests uses.

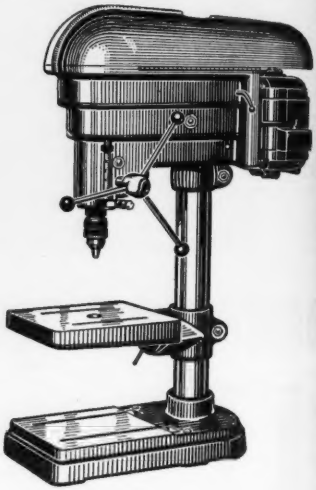
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Models added include single and multiple spindle floor types, Morse taper spindle types, and a complete range of slow-speed models (5 speeds from 425 to 3,340 r.p.m.) in single and multiple bench and floor types. The manufacturer has also added several high speed



Boice-Crane 5/8-In. Capacity "Helmet-Head" Drill Press

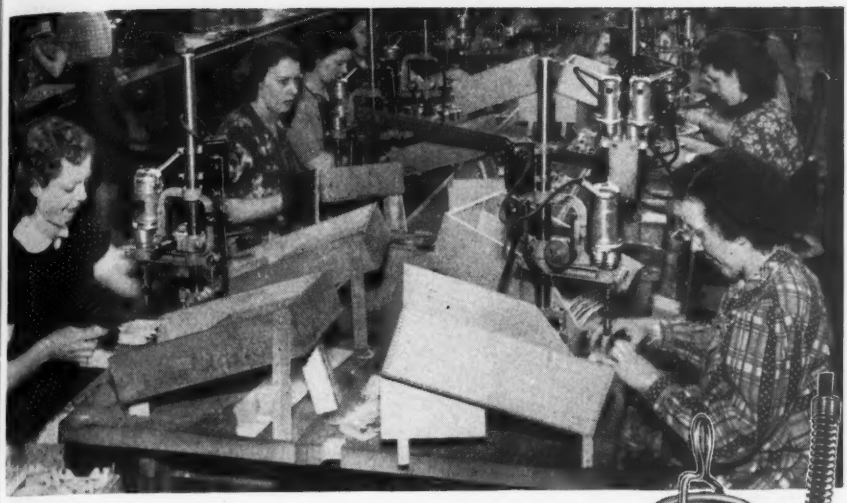
tapping machines to the "Helmet-Head" line and reports also that separate drill press heads, columns, and column flanges are now available for building up low-cost special drilling, reaming, and tapping tools.

Literature containing information regarding the mechanical construction, performance, and cost of the Boice-Crane 5/8-In. Capacity "Helmet-Head" Drill Presses can now be obtained from the company at the above address.

Service Die-Handling Lifter

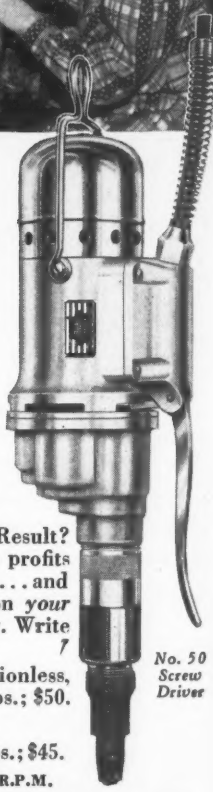
A portable lifter which combines three die-handling operations in one has been placed on the market by The Service Caster and Truck Co., N. Brownswood Ave., Albion, Mich. By means of the lifter, dies can be taken from or replaced in the storage shelf, transported from storage to press, and placed in or removed from the punch press.

In taking dies from storage, the lifter



WORK *becomes Play*

AND EVERYONE'S A WINNER!



No. 50 Screw Driver

These girls have a boss who knows his opportunities. First he installed a battery of Millers Falls electric screw drivers—always cost-cutters in any plant. Then—aware that these smooth, powerful units could take plenty of punishment without hurting themselves or tiring the operators—he arranged a continuous competition, one side of the table vs. the other, with one-hour innings and extra bonuses for the winners. Result? Work becomes play . . . fun without fatigue; the boss, too, wins profits without penalty. *The tools paid for themselves in two months* . . . and they'd only just begun to earn! Let us arrange a free trial on *your* work . . . there's no reason why you shouldn't profit the same way. Write us today.

Patented "Adjustomatic" Clutch makes No. 50 smooth, vibrationless, sensitive, permitting delicate assemblies, long life: weight 4¾ lbs.; $50.

No. 51 has side handle and locking trigger switch; 5 lbs.; $48.

No. 52 is streamlined for close quarters; easy toggle switching; 4½ lbs.; $45.

All three available in choice of four speeds: 800, 1200, 2000 or 3000 R.P.M.

MILLERS FALLS COMPANY

GREENFIELD • MASSACHUSETTS

MILLERS FALLS TOOLS SINCE 1868



Service Die-Handling Lifter

is wheeled up to the rack and the platform elevated to the proper level. A steel cable running from a winch inside the frame is attached to the die with a nut and bolt. The operator, standing on the floor, turns a crank which pulls the die from the shelf to the lifter's roller platform, and the platform is lowered to a convenient carrying position. After the lifter has been wheeled to the press, a few turns of a crank elevates the die to the level of the press bed where it is pushed off and adjusted to the proper position.

The Service Die-Handling Lifter is powered with a hand-operated lifting unit having two lifting speeds. Capacity of the machine is 4,000 lbs., overall height is 8 ft. and base width is 30 in. Lifting of dies is accomplished by means of twin roller chains. A worm gear safety hinge permits the top half of the machine to be folded over in order to pass through doorways. Total lift of the unit is 5 ft. 8 in. and the lowered height of the platform is 11 in. The platform measures 36 in. out from the uprights by 30 in. wide and will accommodate an auxiliary 30 x 30-in. roller platform.

Lima Automotive Gear-Shift

An automotive gear-shift which is said to provide for instant interchangeability in speed without any belt shifting is now being offered by the Lima Electric Motor Co., Division of Lima Armature Works, Inc., 438 N. Main St., Lima, Ohio. The gear-shift is built to give three speeds forward and one reverse or four speeds forward and reverse with the aid of a reversing switch. It is built as an integral part of the motor and also as a gear-shift drive which can be used with

"OUTWEARS the best Bronze Metal"

20 years ARGUTO without a drink—

ARGUTO OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.



McGILL MANUFACTURING COMPANY
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VALPARAISO • INDIANA



On any Shape or Material- for Hand or Power Cutting

No matter what the type of work, VICTOR Hack Saw Blades-Tungsten and "Moly," Hand* and Power—break records for fast cutting and long life.

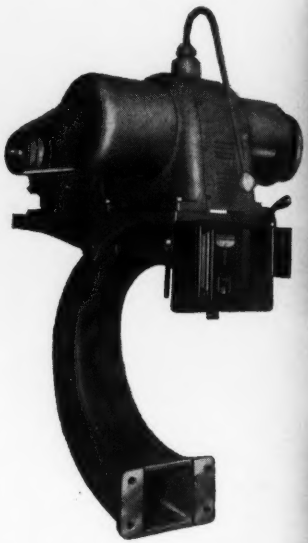
In addition, the modern metal boxes* protect the blades until used, are handier in blade selection and are preferred by workmen because of their convenience.

VICTOR Hack Saw Blades, hand and power, tungsten and "Moly", are made by Victor Saw Works, Inc., Middletown, N. Y. VICTOR Hand Blades are packed in modern metal boxes. VICTOR Frames are available in four types; all suitable for use with blades of all types and sizes.

702

any standard motor. A lathe brack for use with the latter unit is also mad

Because of its instant speed chang ability, the Lima Automotive Gea Shift, the manufacturer states, is find ing quick acceptance for use on lathes milling machines, jointers, planers, dri presses, grinders, and other machine

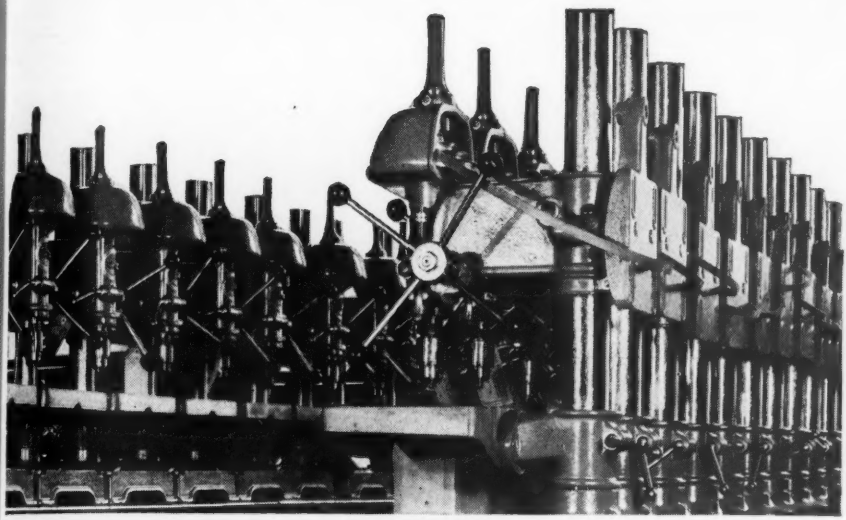


Lima Automotive Gear-Shift

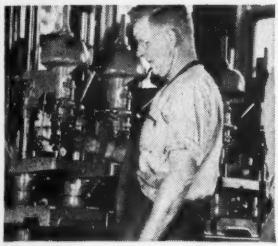
with which there is need for speed changes. The complete motor and gear- shift mechanism is installed to elimi nate countershafts of central powe drives. The gear-shift drive alone i normally installed on machines whic are already driven by individual motors

National Steel-Treating and General Utility Furnace

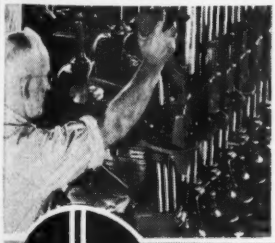
A steel-treating and general utilit furnace designed to operate with th flame of a blow torch is announced b the National Safety Device Co., 836 W Hubbard St., Chicago, Ill. According to the manufacturer, the furnace wi operate with any make or size of blow torch and can be raised or lowered easily so that the flame opening will b



THE AMERICAN WAY ☆ PRODUCTION MACHINES BUILT BY PRODUCTION METHODS!



Rigid inspection of every Walker-Turner machine, coupled with precision manufacture, provides long service-life and operating economy.



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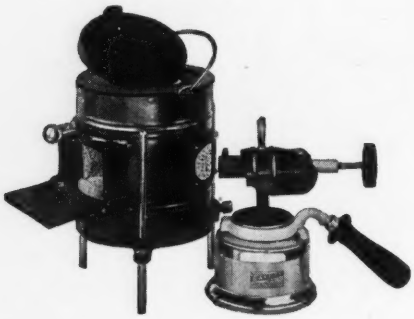
walker-Turner COMPANY, INC. PLAINFIELD, N.J. U.S.A.

WALKER-TURNER MACHINE TOOLS

FOR METAL, WOOD AND PLASTICS

in line with the blow torch burner regardless of the height of the torch.

The top of the furnace carries a pan of special heat-resisting iron which can



National Steel-Treating anad General Utility Furnace

be filled with sand heated for drawing the temper on small tools. Beneath the pan is located a top grating shaped to fit a lead or babbitt ladle in the event the owner wishes to use the furnace for heating lead or babbitt metal.

The door of the furnace opens level with the inset bottom of the unit, enabling the users to pull the part to be heated out upon the open door for examination. Work to be partly heated can be placed on the door while it is open. The furnace is also said to be useful for heating large soldering irons. The unit is lined with fire brick ¾ in. thick and a heavy gauge blue steel shell. Legs and door latch are chrome plated.

Economy Shop-Lifter

Economy Engineering Co., 2651 W. Van Buren St., Chicago, Ill., has placed on the market the Economy Shop-Lifter shown herewith, for use in handling dies. With the machine, one man can pick up a die, transport it through the plant, and lift the die into a press or storage space. The Shop-Lifter can also be used for lifting heavy metal parts, for stacking boxes, skids, and drums, as an adjustable table for machine work, and as a truck for material handling.

STANDARD FAVORITES Belonging in Your Shop

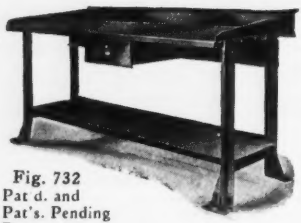


Fig. 732
Pat'd. and Pat's. Pending
Drawer is extra.

"HALLOWELL" STEEL Work-Benches

They're indestructible and provide lifetimes of smooth, rigid, splinter-free surface ideal for precision or heavy work. Standardized construction permits easy movability. 1367 styles and models, with either steel or attractive, durable laminated wood tops, are available right from stock to meet every requirement and costing less to buy than to build wood makeshifts. Write for our catalog.

"HALLOWELL" STEEL TOOL STANDS

Keeps tools safely under lock and key yet always handy and in order. Many models to choose from. Write for details.



Fig. 1748

STANDARD PRESSED STEEL CO.
JENKINTOWN, PENNA. BOX 556
— BRANCHES —
BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

LUFKIN
HEAVY-DUTY MICROMETERS



Here's the ideal "Mike" for your production work. You can give it plenty of hard use and need NEVER doubt its accuracy. The frame is extra sturdy though comparatively light weight and the action is as smooth as velvet. The Lufkin system of markings gives accurate, positive readings at a glance and the exclusive adjustment features let you keep the tool permanently accurate. Made in sizes from 1 to 12". Send for Precision Tool Catalog No. 7.

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NEW YORK
106 Lafayette St.

THE LUFKIN RULE CO.
SAGINAW, MICHIGAN

Canadian Factory
WINDSOR, ONT.

TAPES — RULES — PRECISION TOOLS

WE INVITE YOU TO CHECK THESE FACTS

A DREMEL MOTO-TOOL OFFERS

- √ **27,000 R. P. M.**
  (The speed essential for good grinding and to conserve cutters)
- √ **FULL BAKELITE SHOCKPROOF HOUSING**
- √ **WRENCHLESS CHUCK**
- √ **PERFECT BALANCE**



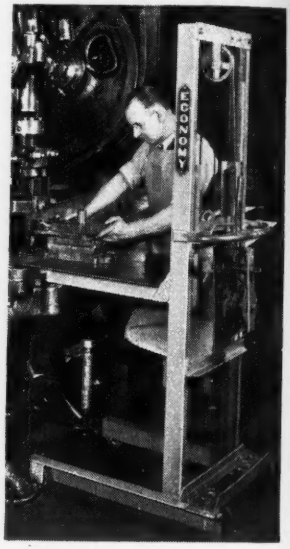
MASTER MODEL
***Only* 16.50**

Compare, feature for feature, any of the small offhand grinders on the market, regardless of price, with a *Master Model Moto-Tool*. Then note that in addition to its many exclusive advantages the *Moto-Tool* is precision-built for precision work. Its armature is dynamically balanced to eliminate vibration. It has oilless (oil sealed) bearings and built-in cooling fan. Air filter keeps out dirt and grinding particles. Weighs only 13 ozs. Operates on either AC or DC 110-120 volt current. Sold by better dealers on 10 day, money-back trial. Write for catalog of Dremel tools, equipment and special combination offers.

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Dept. 220-J **Racine, Wis.**

INSIST ON A DREMEL
MOTO-TOOL
100 TOOLS IN ONE

A sturdy hand-operated hoist u raises and lowers the platform of t machine to any desired height betwe limits of travel, and an automatic u clutch holds the platform at any heig until cranked down. Basewheels of a ple size are said to make the Sho Lifter as flexible as a hand truck whe moving a full load through the sho and structural steel members electr



Economy Shop-Lifter

cally arc welded are claimed to pro vide a rigid framework for long lif under hard usage.

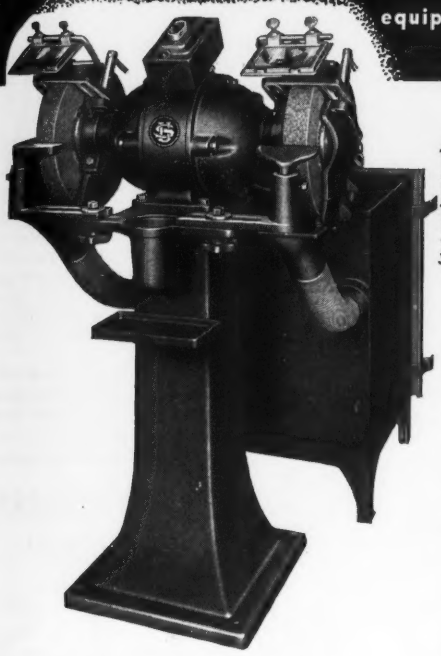
Specifications of the Economy Shop Lifter are as follows: capacity, 500 lbs. overall height, 72 in.; platform lift, 5 in. above floor level, lowers to within 8¼ in. of floor; base frame, 24 in. wid x 33 in. long; platform, 24 in. x 24 in. steel plate; basewheels, 4-in. diameter iron wheels; entire frame of machine o structural steel, electrically arc welde throughout; crank up and down hois unit; two swivel casters and two sta tionary wheels with push bar furnished or as alternate, steering lever handl with automatic floor lock feature painted olive green finish. The ne weight of the Economy Shop-Lifter i approximately 250 pounds.

AND NOW...

Model No. 500 "UTILITY" MOTOR-IN-HEAD GRINDERS

equipped with health-protecting

★ SELF-CONTAINED DUST COLLECTOR



MODEL No. 500 GRINDER

A GREAT machine becomes a still greater factor in your plant's efficiency . . . conserving operator's health . . . cutting production costs . . . helping you get jobs out quicker.

THE DUST COLLECTOR is a self-contained, all metal unit for removing dust and abrasive particles from the air . . . adding to comfort of workmen and increasing efficiency of the machine. Harmful particles are drawn into filter cabinet and cleaned air is returned to room from top of filter cabinet.

Ball bearing; totally enclosed motors absolutely proof against injurious dust or dirt; permanently lubricated; adjustable tool rests; adjustable wheel guards; lift-out water pot; instant start to full speed and many other features.

We favor adequate preparedness for National Defense and recommend enlistment to eligible young men.

LET US SEND YOU CATALOG No. 56

Note: U.S. Dust Collectors can be used with any grinder or buffer with wheels up to 18" dia.

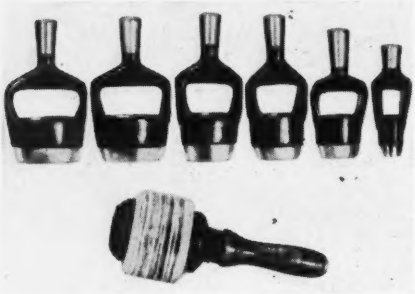
THE UNITED STATES ELECTRICAL TOOL CO.

THE GOOD MECHANIC'S CHOICE

CINCINNATI, OHIO, U.S.A.

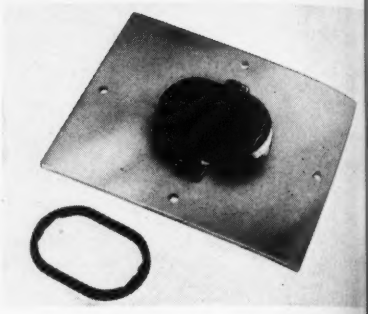
Bates Punches

"Old Fashioned" hand forged steel arch punches, hand forged press punches, and machine turned hand finished high speed rotary punches are announced by H. O. Bates, 251-257 N. Broad St., Elizabeth, N. J. The Bates



Bates "Old Fashioned" Hand Forged Steel Arch Punches with Rawhide Mallet

"Old Fashioned" Hand Forged Steel Arch Punches, several sizes of which



Bates Hand Forged Press Punches

are illustrated herewith along with a rawhide mallet for use with the punches, can be furnished for cutting any practical shape or design. The mallet is made of a series of rawhide washers clamped tightly in a cast iron handle that fits the hand, and is furnished in several weights to suit the particular punching job.

Bates Hand Forged Press Punches and Dies, which were developed to supplant inferior steel rule dies, are hand forged

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Let us prove to you Weldon is *BEST*.

Send for our New No. 8 Catalog

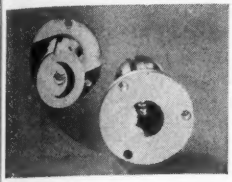
THE WELDON TOOL CO., Dept. MA, 3000 Woodhill Road, Cleveland, Ohio

No. 3 of a Series of Interesting Case Histories

SUNNEN
Precision Honing Machine

Subject:

Accuracy Increased—Production Time Lowered



THE PROBLEM of the manufacturer of the gyroscope balance valve body shown above was to increase the accuracy of the finished holes. The previous method of finishing was reaming, which caused serious bell-mouthing of the narrow circular lands.

Tests were made on the Sunnen Precision Honing Machine and the machine was recommended for the job. Since this machine has been on the job the bell-mouthing of the lands has been entirely eliminated. Perfectly straight round holes are produced with a super-smooth finish that is superior to the best they had received before. In addition, production is increased and time is saved.

Solves Five Problems for the Tool Engineer

The Sunnen Honing Machine:

1. Corrects errors of out-of-round and taper produced by previous operation.
2. Produces super-smooth surface finishes.
3. Accurately finishes holes to very close tolerances as to size and straightness.
4. Maintains alignment already established by previous operations.
5. Provides a simple, low cost production method for accurately duplicating sizes.

It is ideally suited for assembly operations, repair and salvage work, short run production, tool room and experimental work and for the job shop.

When specifications demand straight, round holes, there is no faster, more accurate method of finishing than the Sunnen Precision Hone.

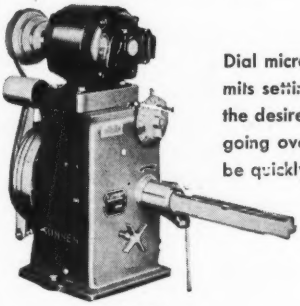
Wide Range

The Sunnen Precision Honing Machine handles any straight, round hole free from full length key way from .245" to 2.400" diameter and up 7" in length with a guaranteed accuracy of .0001"—providing positive alignment.

Let Us Prove It Free

Send us several samples of parts which you are now finishing by other methods and tell us your problems. We'll hone them to your specifications and return them with complete operation data, or write today for complete bulletin on Sunnen Precision Honing. It's free.

Sunnen Model "MA" Precision Honing Machine

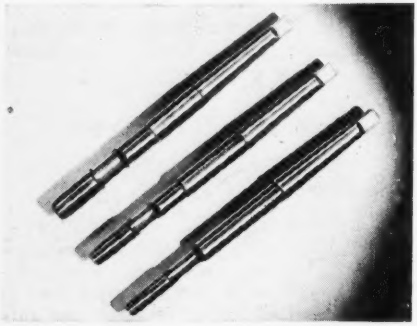


Dial micrometer stop adjustment permits setting the stone to remove only the desired amount of metal, prevents going oversize. Cutting pressure may be quickly set for light or heavy pressure. Shipped complete with 1/3 horsepower, 110 volt, 60 cycle motor.

SUNNEN

SUNNEN PRODUCTS CO., 7933 Manchester Avenue St. Louis, Mo. • Chatham, Ont.

to any practical shape from a wear-resisting tool steel and are hardened. They are then mounted on a steel back-



Bates Machine Turned Hand Finished High Speed Rotary Punches

ing plate for use in a foot or power press. Dies can be detached for sharpening, but since they are so substantially constructed, the dies are said to stand up even on the most difficult materials.

Bates Machine Turned Hand Finish High Speed Rotary Punches are desig ed for cutting round holes in resili rubber and other pliable materials acc rately. In experimental tests, it h been found that by tapering the cutti edge of the rotary punches in a certa manner, accurate and clean holes c be cut with ease even in resilient ru ber.

Accessories Now Available for Physicisits Profilometer

The Physicists Research Co., 343 S Main St., Ann Arbor, Mich., manufac turer of the Profilometer, has develope two accessories for use with this in strument which is designed for th measurement of surface roughness. A new instrumental modification is als said to extend the practical application of the Profilometer.

The first of the accessories, know as the Mototrace, is an instrument fo mechanical operation of the tracer whi is moved across the surface to be mea ured. The Mototrace has four specifi applications. It is used when the trace

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RUTHMAN
GUSHER
COOLANT PUMPS

Like all fine tools Ruthman Gushers are precision built to withstand constant, hard use. That is why leading machine tool builders specify Gushers as standard equipment. End your pump worries today. Write for engineering data and specifications.

A complete line of Coolant Pumps from 1/30 to 2 H.P. in types and capacities up to 200 gal. per minute, a pump for every requirement you may have. Ruthman Gushers come in immersed types, tank units, pipe-connected types, flange mounted types and plain drive types. There is a Ruthman Gusher Coolant Pump to meet every type of machine tool coolant requirement. Sheets giving dimensions and performance curves are yours for the asking.



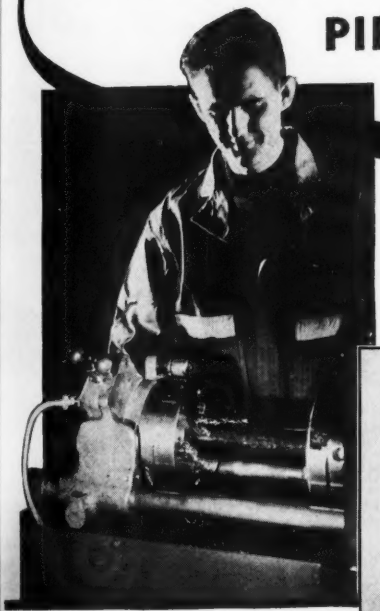
MODEL 11023-E

THE RUTHMAN MACHINERY CO.
538 EAST FRONT STREET CINCINNATI, OHIO
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

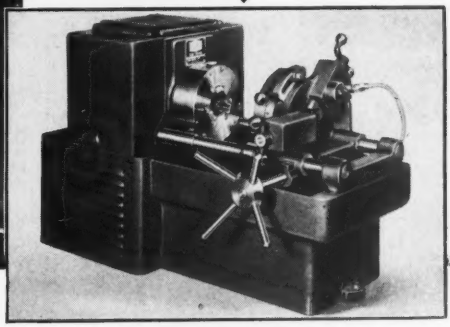
Pat. and Pats. Pend.

The New "TOM THUMB" PIPE THREADER

OSTER



Study these modern features



1. MODERN DESIGN—all BALL BEARING construction.
2. COMPLETE RANGE—½" to 2"—up to 8" with drive shaft.
3. DIE-HEAD—quick-opening, fully adjustable—heavily built.
4. DIES—High Speed Steel.
5. CUT-OFF DEVICE — High Speed Steel, lathe type tool with V Block steady rest.
6. REAMING AND CHAMFERING DEVICE — High Speed Steel forming tool does both operations at the same time.
7. TWO CHUCKS—front chuck, bar operated, three jaw, gripping—rear chuck, three jaw, wheel operated, centering. Both chucks, quick acting.
8. MOTOR—Black & Decker, ½ H.P. universal, reversible, variable speed—light socket operation.
9. WORM GEAR DRIVE — hardened and ground, steel worm with bronze worm gear.

WRITE US FOR DETAILS AND THE UNUSUALLY LOW PRICE

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Cut faster—with smooth flat edges. Handle GREATER VARIETY OF SHAPES without adjustment.



Round Sheet



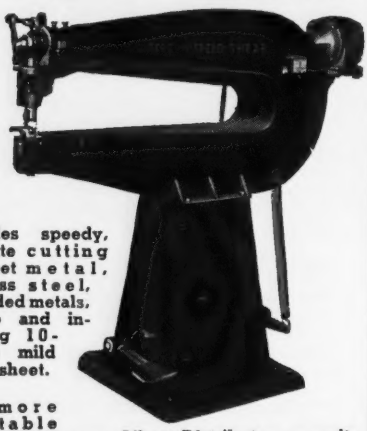
Oval Sheet



Square Sheet With Rounded Corners



Development of Sheet for Tapering Body With Oblong Bottom and Round Top



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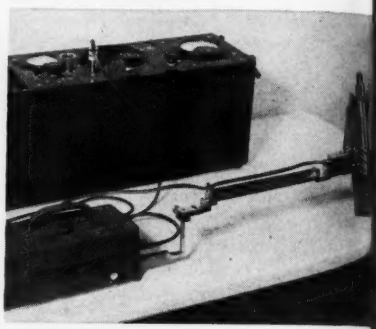
LIBERT MACHINE COMPANY

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MANUFACTURERS OF SHEARS SINCE 1915

Libert Hi-Speed SHEAR

is on very narrow surfaces or sm areas where the available tracing di tance is only 1/32 to ⅛ in.; in inacces ble places near shoulders and ho where the tracing distance is restricte on very smooth surfaces (e.g., ½ to microinches) where extraneous vibra tion makes manual tracing difficult, a in small holes or other surfaces mea ured with the Type I tracer describe below. Two motions are provided. Th first is a constant speed linear motio



Profilometer with Mototrace and Type I Tracer

automatically reversing at both ends The second motion is a cam-driven con stant-speed, quick-reversal reciprocatin motion, adjustable from 1/64 to ⅛ inch

A special tracer, designated as the Type I Tracer, has been developed for measuring the roughness inside holes as small as ½-in. diameter. A modifi cation for even smaller holes can also be furnished on special order. The Type I Tracer is also useful for measuring the roughness of gear teeth and other difficult-to-reach surfaces. The close spacing of the pilot skids of the tracer makes it desirable to use the Mototrace described above for most applications.

A special Profilometer with a one microinch scale can now be furnished when required. The most sensitive scale on the standard Type P Profilometer is three microinches, but on especially fine work, such as gages, greater sensitivity is required. The special model Profilometer incorporates an additional point on the range switch which is said to provide the unit with three times the sensitivity of the standard model. Except for this modification, the special model Profilometer is identical in size and appearance with other Profilometers.

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Trico Unbreakable Loose Pulley Oiler

A visible, unbreakable loose pulley oiler for slow and high speed applications without flooding has been announced by the Trico Fuse Mfg. Co., 2848 N. 5th St., Milwaukee, Wis. The oiler, according to the manufacturer, is intended to replace common grease or oil cups, supplying visible, automatic, fool-proof lubrication, prolonging the life of bearings, and eliminating costly shutdowns and repairs.



Trico Unbreakable Loose Pulley Oiler

Three distinct principles of operation are employed —thermal, capillary, and gravity action. The copper tube of the oiler transmits the heat of the pulley hub to the oil reservoir to produce quick thermal action. The wire reinforced wick feeds oil by capillary action, and the oil is dropped on the bearing by gravity. According to the manufacturer, no adjustments are necessary and no attention is required except for occasional refilling of the reservoir. The Trico Unbreakable Loose Pulley Oiler is available in 1 and 2-oz. capacities with ⅛ or ¼-in. pipe thread fittings.

Van Keuren Internal Gear Wire

The Van Keuren Company, 176 Waltham St., Watertown, Mass., has placed on the market a set of measuring wires suitable for checking internal spur gears. The set is designated as the No. 26IN.

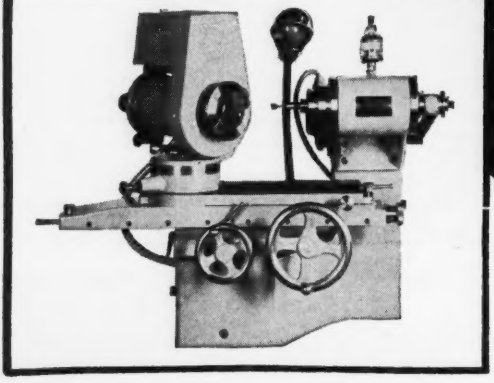
It is claimed that this is the first time that a suitable series of wires for checking internal spur gears has been available. The series is based on size 1.44 in. DP . This gives a maximum number of sizes that are exact in even thousandths of an inch and also results in some sizes being common with

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INTERNAL GRINDER

IG-1



An accurate grinder suitable for set-ups that require quick changes for straight, tapered and beveled holes or for single-purpose production. Diamond dresser automatically controls selected hole size.

By changing spindles, this model grinds all sizes of holes from 3/16" to 3".

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9" Cutting Flute
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Size	Length Overall Inches	Length of Flute Inches	Our Net Price Each
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7/32	12	9	1.60
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9/32	12	9	1.85
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the external gear series, which is 1.728 in.

DP . A complete set of tables giving measurements between the wires for even and odd tooth gears from 10 to 171 teeth and for pressure angles of 14½, 20, and 30 deg. is available.



Van Keuren No. 26IN Internal Gear Wire Set

Skilsaw Disc Sanders

Three additions to the line of Skilsaw Disc Sanders have been announced by Skilsaw, Inc., 4743 Winnemac Ave., Chicago, Ill. The Model "SP" is a two-speed heavy duty sander and polisher specially developed for steady use in metal fabricating plants where there is need for a variety of sanding, polishing and buffing operations. When operating at a speed of 4,200 r.p.m. with a 7-in. disc, it provides a maximum of sanding efficiency. When changed to 1,300 r.p.m. the tool is ideal for use with felt rubbing pads or lamb's wool polishing bonnets for rubbing down lacquered surfaces and other polishing operations. A simple gear shift makes it easy to change from one speed to the other. Eight heavy duty ball bearings mounted on all shafts make possible the carrying of maximum loads and ensure quiet operation and long life. The Model "SP" is 18½ in. long and weighs 14¾ pounds.

The Model "H2," shown in the illustration, is a two-speed heavy duty sander which is said to provide real economy wherever sanding work is constant in nature. A 9-in. disc is used first at speed of 2,700 r.p.m.; then, when the

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- ☐ 780—Cutting Off Wheels
- ☐ 786—Theory and Practice of Roll Grinding
- ☐ 848—Tool Room Grinding
- ☐ 926—Gradings, Tool Room Wheels
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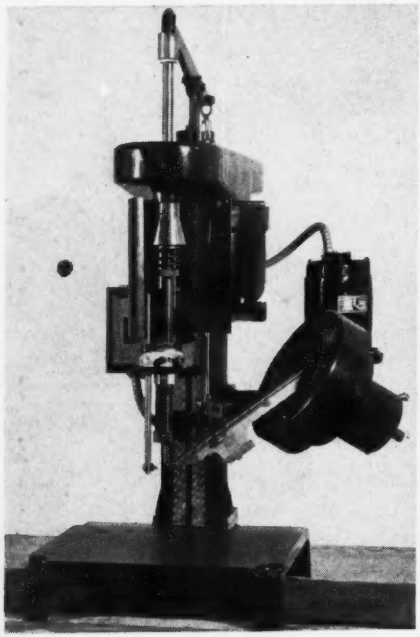
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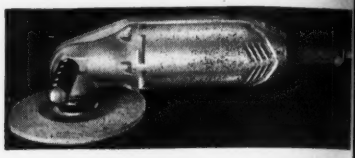
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SEND SAMPLE ASSEMBLIES FOR PRODUCTION ESTIMATES.

DETROIT POWER SCREWDRIVER CO.
5375 Rohns Avenue Detroit, Michigan

outer edge of the disc becomes worn, is resized to a 7-in. diameter, using special disc trimmer which is provid with this sander. The smaller disc then mounted on the alternate 7-in. pa and is used at a speed of 4,200 r.p. Eight heavy duty ball bearings mount on all shafts give this tool added ef ciency and long life. The Model "H is 17½ in. long and weighs 16 pound

The Model "SL" is an extra hea power unit that can handle a wide va ty of heavy duty standing, grindi



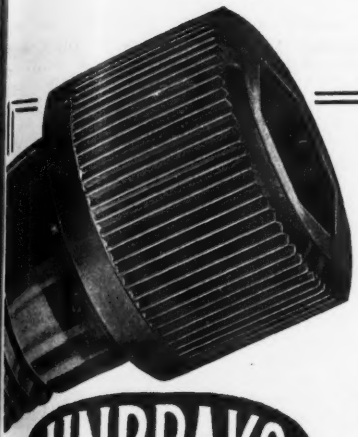
Skilsaw Model "H2" Disc Sander

and surfacing operations. It operate at a no-load speed of 5,000 r.p.m. whic is the speed recommended by grindin wheel manufacturers as the most pra tical for 6-in. wheels to ensure fast pr duction and long life. The Model "SL can be used as a power unit only, or i can be used with various sanding pad grinding wheels, wire cup brushes, an other accessories in the Skilsaw line Length, 18 in.; weight, 15 pounds.

Ryerson S.A.E. 4815 Alloy Ste

S.A.E. 4815, a carburizing nick molybdenum alloy steel carried in sto by the warehouse of Joseph T. Ryers & Son, Inc., 16th and Rockwell St Chicago, Ill., has recently come in prominence for heavy duty gear an shafting applications. In the normaliz condition, its machining properties co pare with S.A.E. 4615 and S.A.E. 2 in respect to cutting speeds and finis Carburizing practice is much the sam as for S.A.E. 2315. Although some sho are quenching direct, the single quen from above the core critical after slo cooling from the carburize temperatu is preferred. Its distortion compar with S.A.E. 2315 or S.A.E. 4615.

An outstanding advantage of S.A.E. 4815 is the high core strength whi may be developed by the single quen treatment. In sections up to 1 in., te sile values up to 200,000 p.s.i. and yi



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Just as the winding stems of the finest watches are knurled to prevent slip—so are the cold-forged "Unbrako" "Better-Grip" Socket Screw Heads knurled to insure a slipless grip in setting up. This feature alone saves time and money, speeds up production, facilitates locking and improves appearance.

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strengths in the neighborhood of 165,000 p.s.i. may be developed in the core, together with hardnesses up to 415 B.H.N., providing excellent backing for the case under crushing loads. The tough, fine-grained case which is readily developed provides excellent resistance to wear, spalling and pitting fatigue.

S.A.E. 4815 steel is recommended for heavy duty parts such as gears, pinions, spindles, splined transmission shafts, and miscellaneous stressed parts of trucks, airplane motors, tractors, machine tools, oil field power transmission and drilling equipment, and other similar applications. The steel is carried in stock by Ryerson in hot rolled rounds (not annealed) in diameters ranging from ½ to 6 in. inclusive.

Bradford Geared Head 12, 14, and 16-In. Lathes

Designed to provide maximum efficiency for general metal manufacturing, The Bradford Machine Tool Company, 657 Evans St., Cincinnati, Ohio, is now offering a geared head lathe in the three sizes most generally used—12, 14, and 16 in. While maintaining simplicity in design as far as possible, the designers have incorporated in these machines all of the up-to-date features which are necessary to accurate, fast production. Each part is made of material best adapted for that part and only skilled labor has been employed in the finishing of these parts and the construction of these machines.

The head is of heavy box-type construction with center bracing to assure rigidity under the heaviest cut. The spindle is of high carbon steel and is mounted on preloaded heavy duty taper roller bearings. Twelve spindle speeds are available in geometric ratio through especially heat treated nickel alloy steel gears sliding on splined shafts and easily operated through three conveniently located levers. Precision taper roller bearings are used throughout for all rotating shafts.

The machine is powered by a motor which is mounted independently in strict accord with the unit construction principle and the drive from the motor to the selective gear shaft is through multiple V-belts and a multi-disc clutch which is controlled from a handle conveniently located at the front of the head. A multi-disc brake is operated



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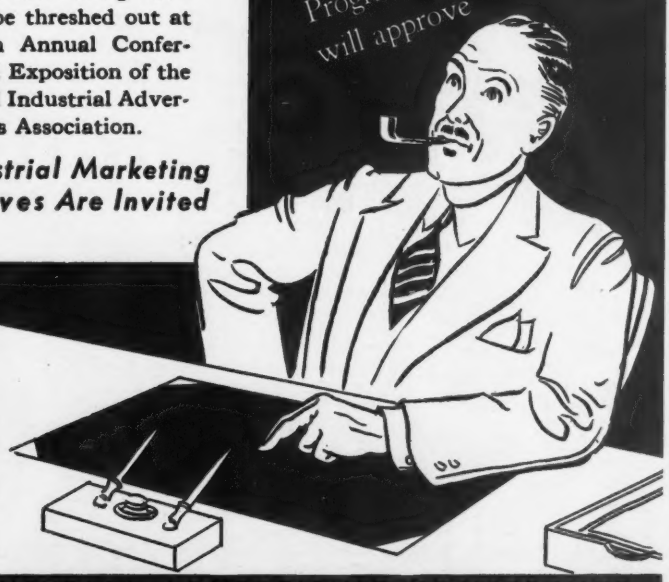
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Programs that management will approve

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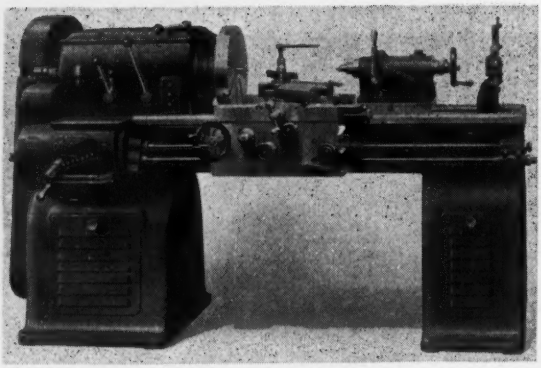
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1940 INDUSTRIAL ADVERTISING CONFERENCE

DETROIT . . HOTEL STATLER . . . SEPTEMBER 18, 19, 20



Bradford Geared Head Lathe

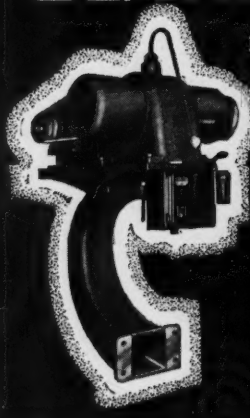
through this same handle for stopping the spindle instantly. The motor is mounted on a hinged bracket in the leg and is easily accessible for belt adjustment. Reverse spindle speeds are obtained by reversing the motor. The motor is controlled by push buttons conveniently located at the front of the head within easy reach of the operator.

The lead screw and feed rod are driven from the spindle through feed reverse gears operated inside the head at the drive end and locked in the selected position by a spring plunger in the shifter handle. The drive to the quick change gear box is through a quadrant gear, also easily accessible. The quick change gear box is arranged for selective feeds and thread cutting.

All moving parts in the head are lubricated by the splash system, and a plunger pump driven from the spindle is provided to force oil to all the roller gearings. Proper oil level is maintained at all times through the use of a constant level oiler. Seals are provided on all shafts and the spindle to prevent oil leakage.

The length of the bed for all three lathe sizes is 6 ft. The swing over the bed of the 12-in lathe is 14½ in.; over the 14-in. lathe is 16½ in., and over the

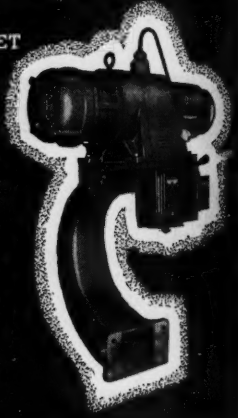
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The belt driven units are designed to drive machines requiring from 1 to 25 H. P., adaptable for either flat or V type belts. The direct motor driven units are constructed in sizes 1 to 25 H. P. Mounting brackets available for all types of machines.

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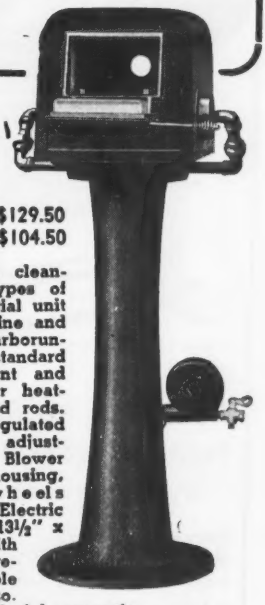
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says R. A. Kaplan, president Owatonna Tool Co., Owatonna, Minn., of the

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Gives speedy, clean-heating of all types of steels. An essential unit for general machine and tool shop use. Carborundum hearth is standard equipment. Front and rear openings for heating long bars and rods. Temperature regulated with air and gas adjustments. Johnson Blower has cast-iron housing, cast-aluminum wheels and General Electric Motor. Firebox, 13½" x 7¾" x 5" lined with 2½" insulating refractory. Available in smaller sizes, also. Unusually economical in operation.

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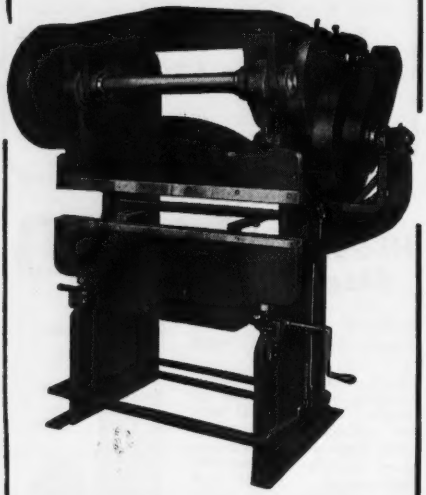
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Sizes 4, 5 and 6 ft. capacities up to 10 gauge.

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DREIS & KRUMP MFG. Company

7418 LOOMIS BLVD.

CHICAGO ILLINOIS

16-in. lathe is 18½ in. All three lathes are 30 in. between centers. There are 12 spindle speeds, forward and reverse, ranging from 16 to 400 r.p.m. on all lathes. The hole in the spindle is 1⅜-in. diameter. The lead screw is 1⅜-in. diameter with 6 threads per inch on the 12 and 14-in. sizes, and is 1⅛-in. diameter with 4 threads per inch on the 16-in. size. On the 12 and 14-in. lathes threads of 2 to 56 pitch can be cut with the quick change gears and on the 16-in. size threads from 1½ to 46 pitch. Standard Morse No. 4 taper centers are used throughout. All three lathes are powered by a 1,200 r.p.m. constant speed motor of 2 to 5 h.p. as required. Without motor, the weight of the 12-in. lathe is 2,800 lb.; the 14-in. lathe, 3,100 lb. and 3,500 lb. for the 16-in. lathe.

For use with the Bradford 12, 14, and 16-in. lathes the following accessories are available: taper turning attachment, draw-in collet attachment with spring collets and chuck to take stock from ⅛ to ⅞ in. inclusive, offset tailstock, thread indicator, set of translating gears for cutting standard Metric threads. These lathes are also made for manufacturing by the Metric system with all indexing collars, lead screw, spindle nose, cross feed, tailstock and rest controlling screws made with mm. pitch.

Gleason Revacycle

The Revacycle, a mass-production machine for cutting straight bevel gears such as those used in automotive differentials, washing machines, and textile machinery, has been announced by the Gleason Works, Rochester, N. Y. Said to be entirely new in principle and design, the machine roughs and finishes gear teeth in one operation by means of a single disc cutter. While normally arranged for the continuous production of one particular gear or pinion, the Revacycle can also be arranged to handle several jobs consecutively. Typical production for an 11 x 16 combination, 5 D.P., is 70 pinions or 50 gears per hour.

The Revacycle cutter has a number of radially arranged roughing blades followed by a number of similarly arranged finishing blades with a gap between the last finishing and the first roughing blade. The cutter is mounted on a reciprocating slide, and, as the cutter rotates in engagement with the gear blank, it moves along the lengthwise direction of the tooth space. As

AVE three ways with ELLERS Drill Grinders



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SAVE on machinists' ne. Your tool room boy an easily grind drills the entire plant.

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NEW INTEGRAL DRIVE PRECISION BENCH LATHE

(Patented)

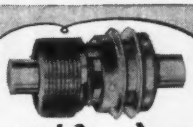
First tool of its class with built-in motor and speed-changing mechanism, entirely eliminating mill-wrighting. Nothing under bench — Nothing overhead. Drive integral with the lathe itself. Marvelous compactness. Any powerful vibrationless speed at a turn of the hand wheel in front. Belted and wired, ready to run. Priced at only slightly more than other precision lathes with separate, complicated drives. Two splendid sizes. (Colored Bulletin J.)

Also Stark Standard Precision Lathes, 6 sizes, ¼" to 1¼" capacity and up to 12" swing; with complete precision equipment. Stark Spiral Bench Millers, the most accurate of their type.

Stark Tool Co. Est. 1862 Waltham, Mass.

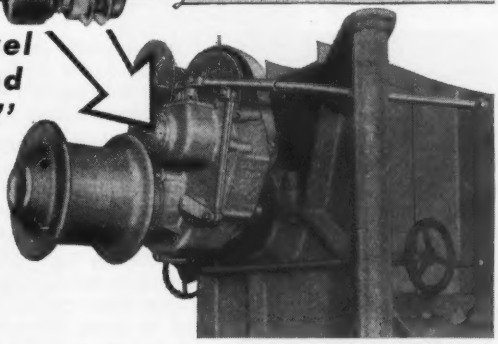
Originators of the American Bench Lathe

Pullmore Clutches

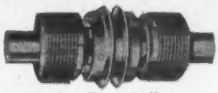


Can't help but marvel the efficiency and durance of this clutch"

mment above comes from manu- cturer of the Foster Catline Hoist wn at right and is representative similar opinions of other Pullmore tch users. A single type Pullmore trols operation of drum in this st . . . a hard pulling job. Pull- re Clutches are accurately built, ged and powerful, operate smooth- and efficiently; are extremely com- ; fit easily into machine designs. ite for Pullmore Blue Book show- applications.



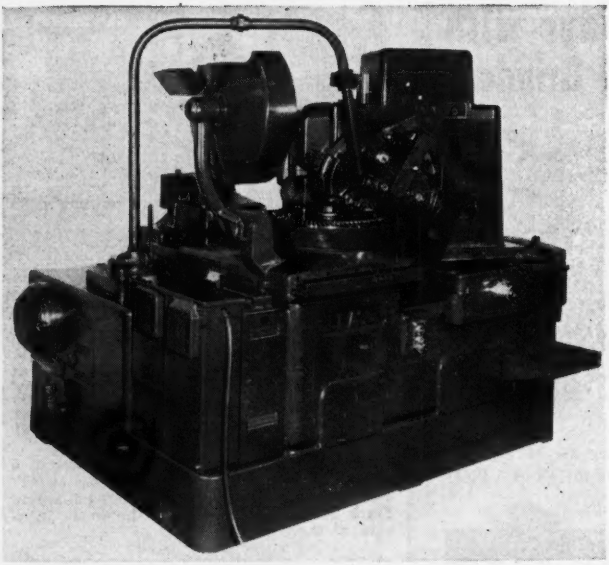
Pullmore Clutches are made in single and double types, for operation in oil or dry, in capacities from 1 to 75 h.p. at 500 r.p.m. Investigate.



Double-Type Pullmore

OCKFORD DRILLING MACHINE DIVISION *Borg-Warner Corporation*

300 Catherine Street, Rockford, Illinois, U. S. A.



Gleason Revac

blades rough
tooth space. O
return stroke, th
ishing blades
the tooth space
has just been r
ed. The blank is
stationary during
ting, and at the
of each return s
of the cutter
blank is indexe
the gap in the c
blades. Each re
tion of the c
completes a to
space. Conjug
tooth forms are
duced as a resu

the cutter moves from the small to the large end of the blank, the roughing the cutter motions and the profile o of the cutter blades.

TOOL LIFE UP 200%



MEANS EXTRA DIVIDENDS FOR YOUR SHOP *with* TECO *Carbide Cutting* TOOLS

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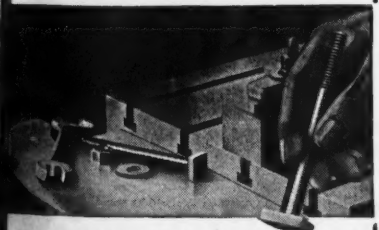
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Another **DoALL** *Achievement*





DO-ALL Contour Machine BAND SAWING BAND FILING BAND POLISHING

1,000 PANS... 50 Times Faster than Old Way

Again DoAll shows it is the most versatile and fastest method to cut all metals by sawing sample wheat pans out of tin for Stremel Brothers, Minneapolis. Four stacks of 250 sheets each—held together with clamp plates—no holes bored. Total time, 1 hour (15 minutes each stack) for complete job.

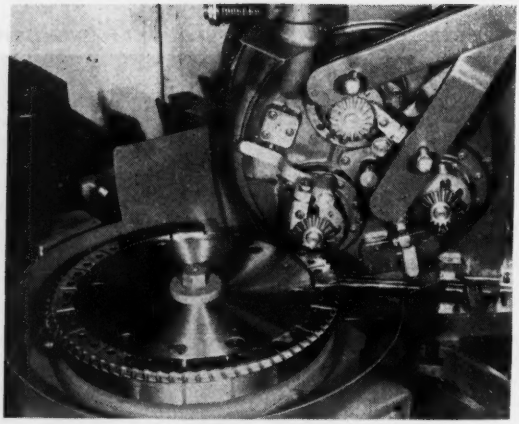
The DoAll is a moderately priced, rugged, precision machine tool that replaces shaping, milling and lathe work with enormous savings of time, labor and material. Cuts out internal and external shapes from any metal up to 10" thick.

Used in large and small plants in 30 countries by manufacturers of all kinds of metal goods, machine parts, dies and tools, appliances, equipment, motor cars, airplanes; also by ship builders, railroads, arsenals, etc. *Write today for data on the DoAll*

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1306 S. Washington Ave., Minneapolis, Minn.



Close View of Gleason Revacycle Showing Working Arrangement of Cutter in Relation to Workhead

Except for chucking, operation of the Revacycle is entirely automatic. No chucking delays are said to be encountered, however, since the machine is provided with a rotary work-holding turret having three spindles. Thus, gears are removed and blanks loa at two stations while cut takes place at a third. W a gear is completed, turret indexes automatic to bring the next blank to cutting station. After bla have been chucked, no furt attention is said to be requi for the machine until t gears have been complet While the machine is in op ation, a built-in conveyor posits the chips outside machine.

The cutter spindle of Revacycle is rigidly moun on precision anti-friction be ings with provision for pe odic greasing. Lubrication all moving parts other th the spindle is provided by circulating oil system, ens ing an ample supply of lub cant. The work is held in pla by a heavy spring and is released by hydraulic piston. Clamping takes pla automatically when a blank is proper chucked; releasing is also automat The index for the work spindle is of t notched plate type with hardened a

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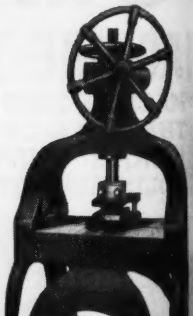
For separating punch and die holders on large liner pin die sets.

For assembling and aligning punches and dies.

As a powerful straightening press or arbor press.

For short broaching operations, pressing out pins from die sets, disassembling spindle or shafts from press fits in bearings.

Ask for bulletin No. 51.



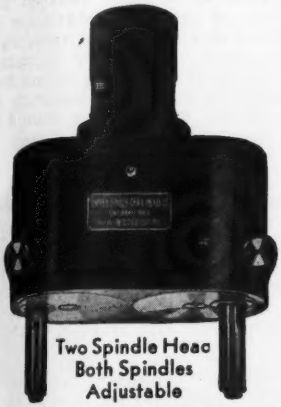
Makers of PRODUCTO Die Sets and Accessories. Shipments from stock at Bridgeport; Detroit, Mich., and Cleveland, Ohio.

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U. S. HEADS

STANDARD SINCE 1915



Two Spindle Heac
Both Spindles
Adjustable

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- 10-30 Times Longer Life
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150% LONGER LIFE

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V/T Super Bond is the most important development in mounted wheels in 30 years.

Let us send you a trial Wheel. Tell us the kind of job, type of equipment you use and size wheel you prefer.

Free Mounted Wheel Chart—

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A small "power house" that can be used wherever there is an electric outlet. Grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, cleans, etc. Uses 300 accessories. Weighs 12 oz., 25,000 r.p.m. $18.50 postpaid with 6 Accessories.



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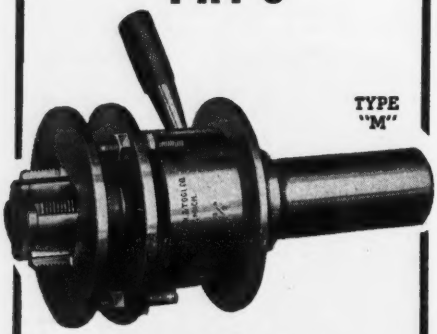
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for tapping all sizes of Shells and Bombs

Threads guaranteed to meet government specifications.

A universal machine tap that can be used as a stationary tap with handle or as a rotating tap by removing handle. Instant trip at set point.

Chasers are rigidly supported and are hooked into tapered seat of the hardened and ground center pin to insure positive opening and closing.

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ALL STYLES OF "SELF-OPENING DIE HEADS," AND "BOLT AND PIPE THREADING MACHINES."

ground index plates. A hydraulic ... included with the machine sup... power for clamping the turret after ... turret index, for chucking a blank, ... for operating the chip remover.

Specifications of the Gleason R... cycle are as follows: maximum ... distance, 3 in.; maximum face, 1½ ... coarsest pitch, limited by a maxim... whole depth of 0.450 in.; ratios fro... to 1 to 2 to 1; pitch diameters f... 2¾ to 5½ in.; index range from 8 t... teeth; floor space, 65 x 85 inches.

Hanchett No. 153 Vertical Spindle Disc Grinder

Illustrated herewith is the Hanc... No. 153 Vertical Spindle Disc Gri... which has been developed by the H... chett Mfg. Co., Big Rapids, Mich. ...



Hanchett No. 153 Vertical Spindle Dis... Grinder

abrasive grinding disc of the machi... is 53 in. in diameter x 1 in. thick and ... made up in eight sections. The disc ... attached to a 53-in. steel plate by mea... of filister head screws fitted throu... openings in the abrasive which is v... canized to thin steel plates. The 53-... steel disc plate is attached to a wh...

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ZIEGLER

ROLLER DRIVE

Floating Holder

for

TAPS and REAMERS

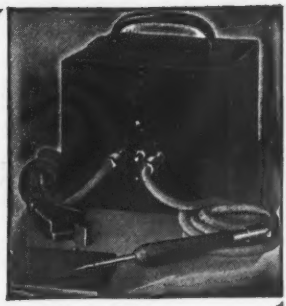


- AUTOMATICALLY compensates for machine spindle misalignment, eliminating over-sized or bell-mouthed holes.
- Helps produce unbelievable accuracy on both new and old equipment.
- Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

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Three sizes to meet all requirements. Also a combined Etchograph and Demagnetizer.

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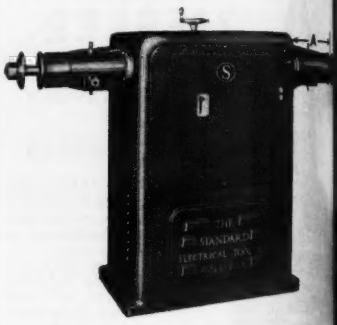
flange 34 in. in diameter x 4 in. thick.

The wheel spindle, which is mounted on preloaded precision spindle ball bearings, is driven by a 25 h.p. vertical motor located within the machine base and connected to the spindle by means of sheaves and V-belts. The spindle has a speed of 435 revolutions per minute.

A rugged oscillating type wheel dresser which passes from the outside to the center of the abrasive grinding disc is built into the machine, thereby making it convenient to maintain a true grinding surface at all times. The wheel dresser can be swung clear of the machine while work is being ground. Openings are provided beneath the grinding disc for attachment to a dust exhaust system. The No. 153 grinder can be arranged for wet grinding and weighs approximately 7,500 pounds.

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The Standard Electrical Tool Co., 8th and Evans Sts., Cincinnati, Ohio, has developed an infinitely variable speed buffing and polishing machine designed to serve any and all requirements buffing, polishing, coloring, and so According to the manufacturer, the rect speed for each operation can ways be obtained, using any size type of wheel. In addition, longer and more efficient production are to be ensured, and worn wheels longer have to be discarded.



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The saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

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NEU-T-ROL releases the work promptly every time and demagnetizes it. Useful on small chucks, it is essential on heavy work.

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Repeat orders from prominent manufacturers are convincing testimonials.



A machine in a class by itself.

With this Universal Tool you can do any tool grinding job within its range, including Carbide tools, at a big saving in time.

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"practical tools for practical men"
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The change in speed is accomplish quickly and easily by merely turning handwheel conveniently located at top of the machine. Each change spindle speed is shown in revolutio per minute on the indicating dial at front, and while the full speed ra is 1,000 to 3,500 r.p.m., the sp changer can be set for any intermedi speed range desired.

All of the equipment, including speed changer, constant speed 1, r.p.m. ball bearing motor and magne starter, is enclosed inside a substan base, while the push-button station located at the front of the machine. movable louvered covers at the si and front and a large removable co at the top front provide easy access the inside of the base.

Features of construction include high-grade nickel-steel spindle with h bronze spindle nuts, four heavy d ball bearings, and liberal oil reserv with visible oil supply. A shaft lock also provided for use when chang wheels.

Available in 3, 5, and 7½ h.p. si with larger sizes furnished to or the Standard Infinitely Variable Sp Buffing and Polishing Machine, is to feature simple construction and e operation, with quiet and smooth p formance. The straight front pede permits the wheels to extend bey the machine proper, allowing a freedom of operation and foot room.

Landmaco Machine for Spe Threading Operations

The unusually flexible design of Landmaco Threading Machine ma factured by the Landis Machine Inc., Waynesboro, Pa., is exemplified

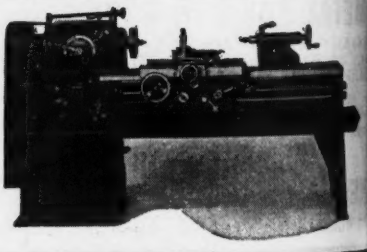
"C & J"

15" and 16" Lathes

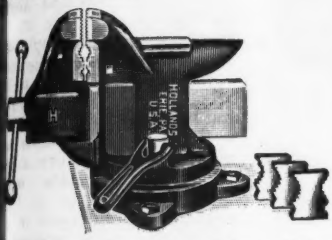
12 Speed Geared Head-Motor Drive
Timken mounted spindle
Modern Design ... Liberal Dimensions

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BATAVIA • OHIO, U. S. A.



The Vise . . .
For Discriminating Mechanics



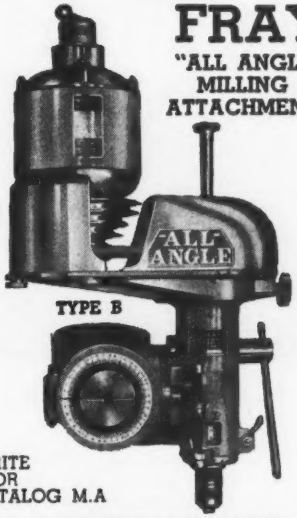
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FRAY
"ALL ANGLE" MILLING ATTACHMENTS



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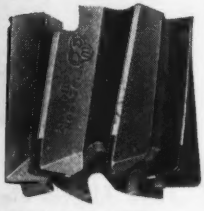
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Buy standard carbide tipped tools exactly as you do high-speed steel tools. These new Wesson tools give you the advantage of 15 to 20 times longer wear and faster cutting speed.

Many tools in this new Wesson line are actually priced lower than the same size and type regular tools. Start now to "cut your cost per piece." Send the coupon for catalog and prices.

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Wesson Standard End Mills

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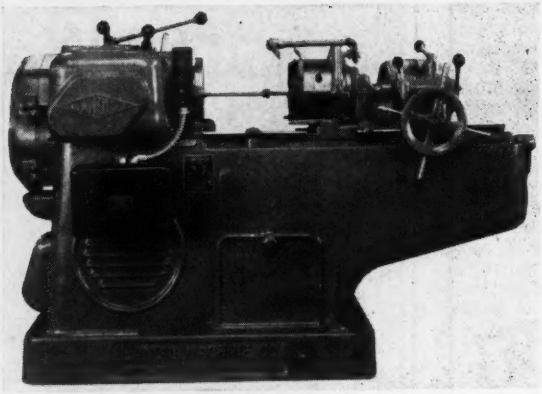
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Landmaco Machine for Special Threading Operations

ing operation being ha
by supporting the work
tween centers, provisio
made on this Landmaco
chine for supporting
work in a like manner.

Special mechanical
tures of the Landma
Threading Machine al
include a faceplate on
machine spindle supplan
the usual die head
special carriage fron
which the die hea
mounted, and a tail
which is adjustable
which also supports a
ter. The faceplate, w
also incorporates a l
center, is employed in
actly the same manner
the faceplate on a grin
machine or lathe; that
to drive the work

the illustration herewith. The Landmaco Machine shown is one which has been recently developed for handling special threading operations in which extremely close tolerances for concentricity must be maintained between the thread and the body of the work. Since such work is usually ground, the grinding

the use of a dog. The special carr
supports the Lanco Die Head which
in this case, used as a stationary
head. Provision is made for ope
and closing the die head with a
when necessary.

The adjustable tailstock is cla
into position on ways located on

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45,000 SPROCKETS IN STOCK FOR YOUR IMMEDIATE NEEDS.

We also have in stock Diamond Chains for all Roller and Block Sprockets.

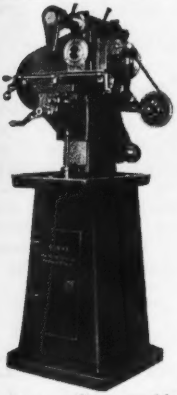
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Mounted on Cabinet Column

...rke motor driven milling machines Nos. 1, ...3, and 4 are specially suited for handling ...all, difficult work on a production basis.

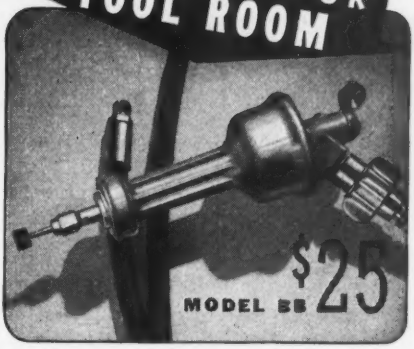
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Kipp Air Tools give you the highest speeds, lowest prices, and are proving indispensable in tool room and production departments. Grinders sell from $9.75 to $58.75, Chippers and Filers at $19.75. The BB Grinder illustrated is only $25. Try one of these handy, fast tools in your own tool room. The FREE trial offer permits any concern with a satisfactory credit rating to try out any Kipp Air Tool for ten days. New catalog gives details.

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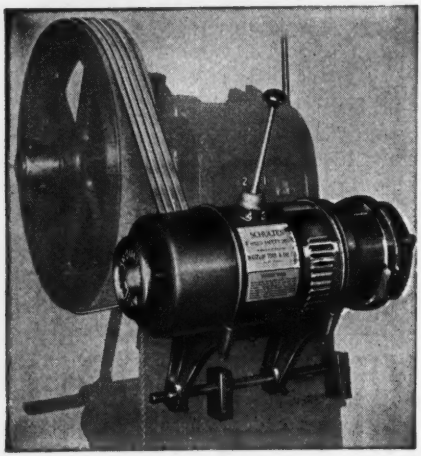
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ALL-HELICAL GEARED 4 SPEED SCHULTES UNIT
Instant Reversibility



Features:

For punch presses, lathes, shapers, milling machines, drill presses, etc.
One lever syncromesh shift controls 4 speeds.
Instant reversibility with all 4 speeds
Adapted to V-belt, flat-belt, chain or direct drive.
Hand wheel permits rotation of machine spindle for set-up work with complete safety.
Cradle adjustment permits the unit to be revolved to any desired position.. placing gear shift lever where most convenient.

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side of the machine bed. These ... are of sufficient length to permit ... ling of work ranging from 2 in. to ... long. The tailstock center is contr... by a quick acting lever located on ... top of the tailstock, and can be clam... rigidly in position.

The special Landmaco Thread... Machine is of the leadscrew type. ... it can be seen that the thread is ... erated by revolving the work betw... centers, the die head being propelled ... to the work and the thread lead ... controlled by means of the leadsc... Since the work is turned, threaded ... later ground between centers, an ... usually high degree of concentricity ... be maintained between the thread ... the body of the work.

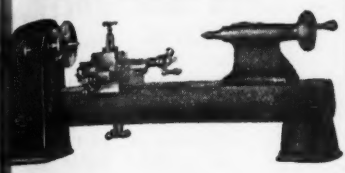
400-Ampere Lincoln Diesel ... Welder Equipped with Gasol... Engine Starting

The application of gasoline en... starting on Diesel driven arc weld... announced previously on a 300-amp... unit by The Lincoln Electric ... Cleveland, Ohio, has been further ... tended and is now available on a ... ampere model such as shown herew... The use of a gasoline engine is said ... make easy starting possible in any ... of weather and to provide the inher... economies of Diesel drive in the ma... applications for engine driven weld... of capacities up to 400 amperes.

The gasoline starting engine is ... small auxiliary unit which is mount... above the Diesel. It is started ... means of a hand crank. A belt dr... engaged by means of a clutch, ... nects the starting engine to the Die... Starting in extremely cold weather ... facilitated by having the cooling sy... of the small starting engine connec... into the cooling system of the Die... This arrangement permits the Diesel ... be warmed up by running the start... engine a short time and allowing ... heated water to circulate through ... Diesel engine.

Of 400-ampere capacity, the "G... Arc SAE" arc welding generator ... on the Diesel welder is equipped ... "dual continuous control" and all of ... other advanced Lincoln features. T... continuous control, by permitting in... pendent adjustment of both voltage ... current, is said to provide a welding

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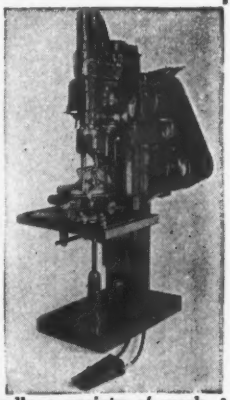
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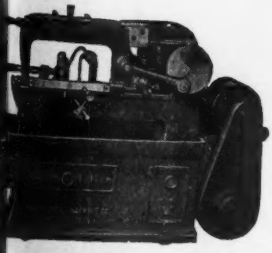
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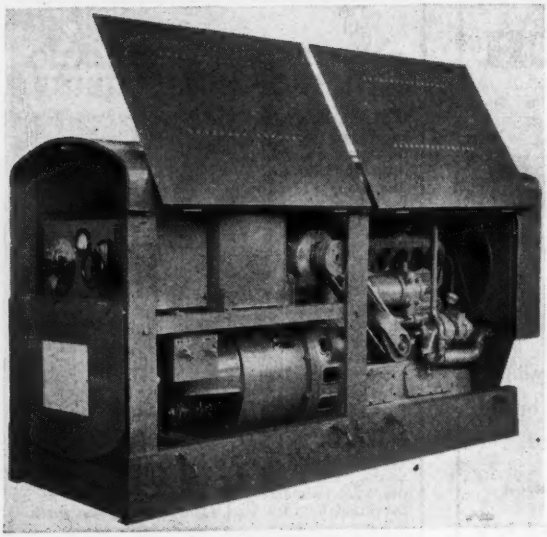
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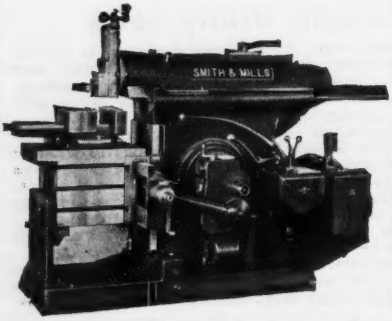
400-Ampere Lincoln Diesel Welder Equipped with G... Engine Starting

ments is claimed to e... the user to obtain lite... thousands of current ... tings. This feature, ... said, assures fast and ... nomical production of ... est quality welds under ... conditions.

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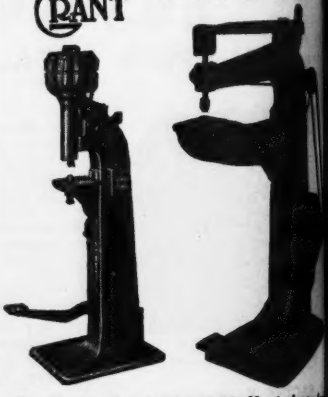
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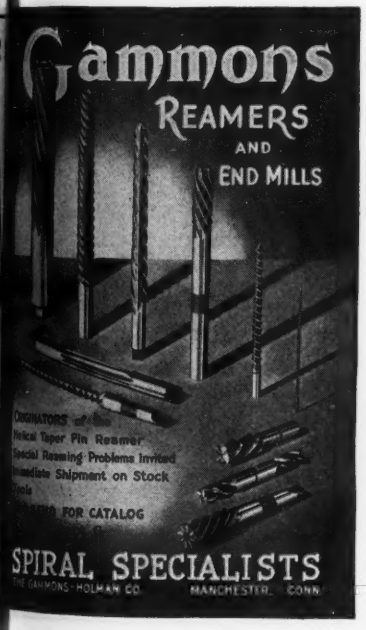


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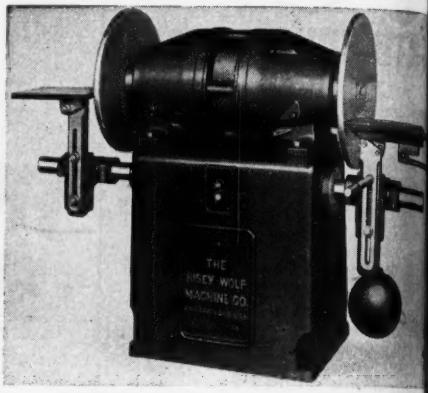
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and a special type of flexible coupling connects the generator shaft to the engine flywheel.

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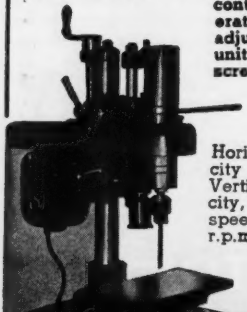
Hisey Improved Direct Drive Disc Grinder

The Hisey Improved Direct Drive Grinder is made in sizes of from 10 h.p. capacity and can be sup with guards having exhaust co

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For small holes .004" to .250" diameter. Self-contained drilling unit swings radially on column and locks to any position. All controls manually operated. 8" vertical adjustment of drilling unit with elevating screw.

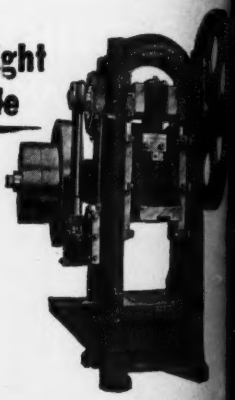


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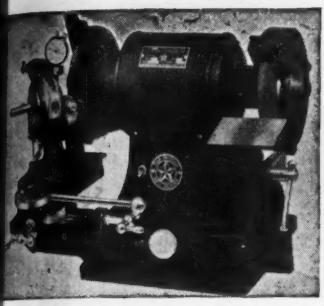
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GOOD NEWS ABOUT
Universal
DRILL BUSHINGS & SCREWS



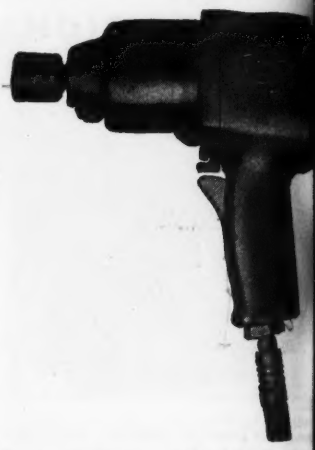
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tions. Combination machines having a disc on one end and a regular grinding wheel or buffing extension on the other can also be furnished.

CP "Power Vane" Reversible Wrenches

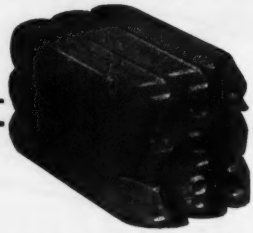
CP 344-R, CP 349-R, and CP 360-R "Power Vane" Reversible Wrenches with bolt size capacities of ⅜, ½, and ¾ in. respectively have been added to the line of pneumatic wrenches manufactured by the Chicago Pneumati Co., 6 E. 44th St., New York, Designed for applying or removing



CP 344-R "Power Vane" Reversible

the wrenches employ slow speed motors which are said to be sim

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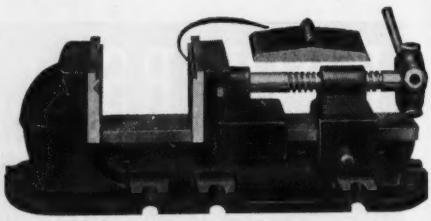
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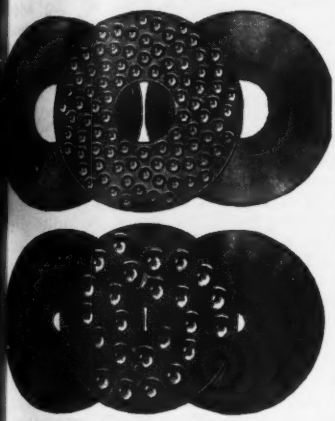
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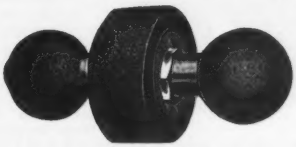
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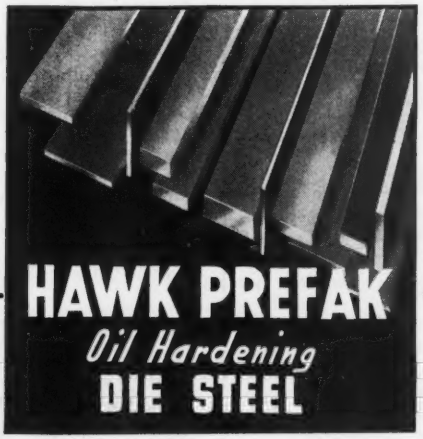
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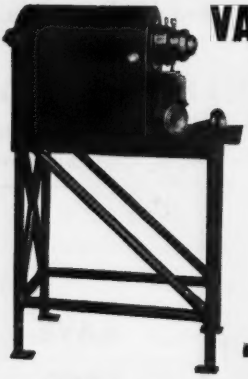


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design, efficient in operation, and nomical in maintenance. In ad the wrenches have no gears or re member in the driving unit, and much as they are light in weigh short in overall length, they c easily handled.

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Wilson Type CH Dual Vo Switch for Arc Welders

The Wilson Welder & Metals Co., 60 E. 42nd St., New York, N. Y. announced a dual voltage switch f stallation on arc welding mac such as the Wilson "Hornet," whe machines are to be used on eith two line voltages at different times switch, designated as the Type CH be used on any motor employing nating current, provided the motor starter are capable of being recon for two voltages. Normally, adjust motor so that it will operate at ferent line voltage requires changi heater elements, disconnecting an connecting the motor and magnet leads. This operation is said to



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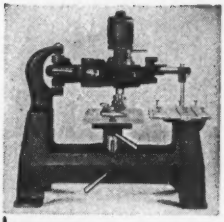
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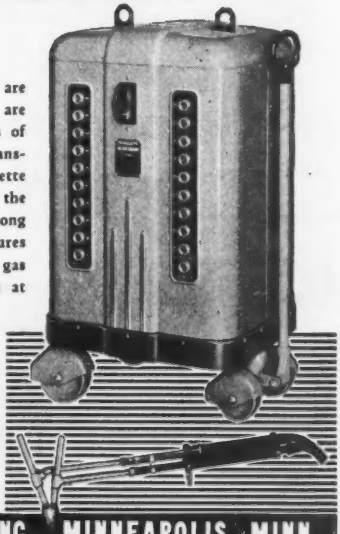
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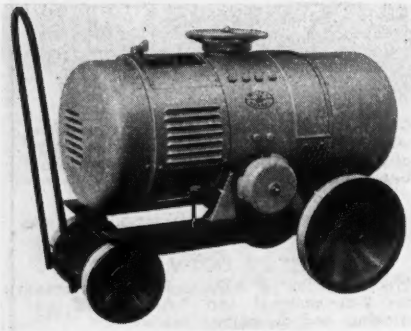


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anywhere from half hour to 2 hours. However, with the Type CH switch installed, the change, it is claimed, can be made in less than one minute. Raised figures on the switch base indicate the



Arc Welder Equipped with Wilson Type CH Dual Voltage Switch

line voltage for which the switch is set.

The Wilson Type CH Dual Voltage Switch consists of two main parts; namely, a base which is mounted directly on the machine and a removable top cover which is held in place center stud and nut. The cover three equally spaced tabs that fi tween bosses on the base. The top can be set on the base in either o different positions, each corresp to a line voltage. According t manufacturer, the dual voltage s can be easily and readily adapt different line voltages. The cente is simply loosened and the top rotated until the desired line v figures are visible. No other adjust is required. The switch can the locked in position for safety.

The standard dual voltage swit designed for 220-440 volts of a delta nected motor, which is the type us Wilson welders. It reconnects the winding and also adjusts the h coil of the magnetic starter and h relays. Other connections such a 440 volts of Y-connected motor a Y-delta connection (380/220) can r be obtained.

The Wilson Type CH Dual Vo Switch is well constructed, and des and built to deliver maximum s under all conditions. Further info tion regarding the switch may be tained by writing Wilson Welde Metals Co., Inc.



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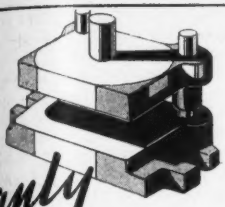
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Danly

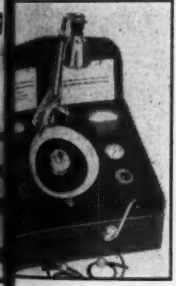
PRECISION *die sets*

Danly Machine Specialties, Inc.
2 S. 52nd Ave., Chicago, Illinois
Milwaukee, Wis.
Island City, N.Y.
Dayton, Ohio
Detroit, Michigan
Rochester, N. Y.
Cleveland, Ohio
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DUCOMMUN
Tools & Supply Co.
Los Angeles, Calif.
San Francisco, Calif.

DANLY SERVICE
9 Danly Branch Stocks Provide 24-Hour Service for 95% of All Metal Fabricating Plants.

Commercial Sets
Special Sets

DANLY
DIEMAKERS' SUPPLIES



DON'T GUESS-- BE SURE *with*

ACCURATE LIGHTING

...h intensity, non-glare light focused ...your job will give you more efficient ...t. Allen Electric and Equipment Co. ...e adapted the VIMCOLIGHT to their ...nograph for easier reading. Vimco's ...years experience will help you solve ...r lighting problem. Write for details.

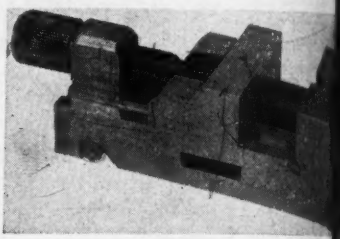
VIMCOLIGHT
...O MANUFACTURING CO.
...ANGO ST. BUFFALO, N. Y.



Marburg Anglemaster Sine Vise

Shown in the illustration herewith is the Marburg Anglemaster Sine Vise which has been placed on the market by Marburg Brothers, Inc., 90 West St., New York, N. Y. Manufactured from suitable steel, heat treated and seasoned before finishing, the vise is said to be quickly and accurately adapted to handling angle grinding, inspection, or layout work. According to the manufacturer, the vise is ground and lapped so as to be perfectly level, parallel, and square, thus finding a wide var... useful applications throughout th... room and shop.

Exclusive features of the Angle... Sine Vise include precision sine... spaced 5 in. apart, which are a... permit quick, accurate angle setti... non-projecting telescoping screw ... it is claimed, provides pressure ... slide jaw where it is most efficie... effective; a removable knurled ...



Marburg Anglemaster Sine Vise

knob which is held in place by a... ternal spring and can be easily de... ed after work is correctly set, ... ensuring against accidental chang... setup; a slide jaw, lapped to a p... fit and designed not to raise wit... work, and an accurate integral V... produced by a V-slot in the exac... ter of the fixed jaw. In grindin... Anglemaster, set at any angle by ... of a size block or planer gage, ... held firmly by ordinary magnetic ... without the use of strapping or c... ing devices. A small block of steel ... on the chuck in front of the tilti... is said to positively ensure ... change of setting.

The Marburg Anglemaster Sine ... is 2½ in. wide x 2 in. high and ... overall length of 6 in. Depth of j...

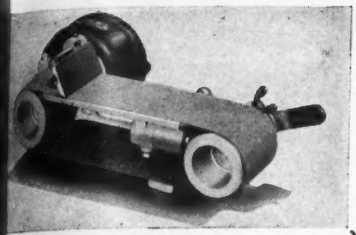
"3-IN-ONE" OIL
protects
HIGH-SPEED EQUIPMENT
Lubricates, Cleans, Polishes, Prevents Rust
THE A. S. BOYLE COMPANY
Distributors - Jersey City, N. J.



For Machine and Tool Work and Quick Set-Ups
The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading. New improvements. Price $5.00. *Write for folder.*
J. R. REICH MFG. CO.
334 TRIANGLE AVE. DAYTON, OHIO

BOKUM Long Life Boring, Bottoming and Internal Threading Tools
Style C

Internal Threading
... for holes from 3/32" up. Three types... twelve sizes. Real money savers for lathe, jig borer, screw machine or boring mill.
Write for bulletin and price list.
BOKUM TOOL CO., INC.
49 W. Hancock St. Detroit, Mich.
Licensed manufacturers of all types and designs of Carbide Tipped Tools
Style A

An Inexpensive
NEW ABRASIVE BAND GRINDER . .

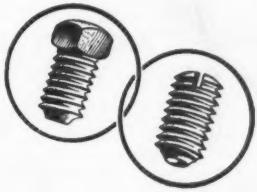
"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

HORMEL-M GRINDER
WALLS SALES CORP.
WARREN ST. NEW YORK, N. Y.

MOORE'S



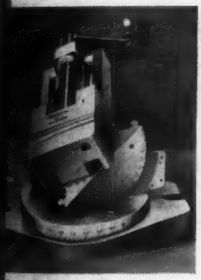
SMALL SET SCREWS

Headless to 1/2-13—
Square Heads to
3/8-16 and Dardelet

PIPE PLUGS: 1/8" and 1/4" Headless, Square Heads and Hollow Heads.

GEORGE W. MOORE
44 Farnsworth St., Boston, Mass.

For 60 Years Mfgrs. of Quality Screws



Universal Vise



Universal Angle Plate

For Fast, Accurate Set-Ups

The WESSON all Steel UNIVERSAL VISE

Gives you faster set-ups and greater accuracy. No more tedious or makeshift measuring. Accurately graduated in all planes. Sturdy cradle design and all-steel construction give greater rigidity; permit faster stock removal. Two sizes, priced for every shop. Can be furnished with slotted surface plate for use as universal angle plate. SEND FOR FREE FOLDER.

WESSON CO., 1050 Mt. Elliot, Detroit, Mich.

Please send me illustrated Folder covering the Wesson Universal Vise.

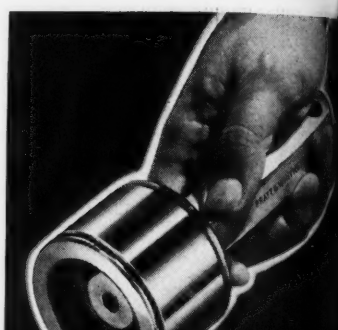
Name .....
Firm .....
Address .....
City ..... State .....

1 in., and the travel of slide jaw is 3 in. Net weight, 5¼ lb.; shipping weight, 6¼ pounds.

P & W "Pilot" Cylindrical Plug Gage

The P & W "Pilot" Cylindrical Plug Gage shown in the illustration has been placed on the market by Pratt & Whitney, Division Niles-Bement-Pond Co., W. Hartford, Conn., for use in the simple gaging of hole sizes of various p... 'The "Pilot" principle of the ga... said to eliminate all difficulty in g... the size of a hole.

Instead of being difficult to start... plug gage can be inserted lightly a... angle, the gage practically falling...



P & W "Pilot" Cylindrical Plug G...

MEASURING INSTRUMENTS

Dial Indicators — Plug Gages
Wires, thread & gear — Gage Blocks
Optical Comparators & Projectors
Measuring Microscopes

SIZE CONTROL CO.
Pure Oil Bldg., 35 E. Wacker Drive
Chicago, Ill.

New Nesting Type Tote Pans



Lots of 50
$1.00 each

20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

Lots of 100 & 200 less 3%; 300 up less 5%

J. L. LUCAS & SON, INC.
1 Fox Street — Bridgeport, Conn.

YOU'LL SAVE TIME
AND TROUBLE . . . BY SPECIFYING NATIONAL TWIST DRILLS, HOBS, REAMERS . . . MILLING CUTTERS, *Special* TOOLS



NATIONAL TWIST DRILL AND TOOL
DETROIT, U. S. A.
Tap and Die Division, WINTER BROS. CO., Wrentham, Mass.
Factory Branches: New York, Chicago, Philadelphia, Cleveland
Distributors in Principal Cities

Grobet
ROTARY FILES
Ground from the Solid



Write for Catalog K...

The most complete catalog of its kin... illustrating hundreds of rotary files ha... cut, milled cut, ground from the solid; also di... sinkers' burs.

GROBET FILE CORP. of AMERICA
3 PARK PLA...
NEW YORK CI...

OTC GRIPOMATIC PULLERS

for PLANT MAINTENANCE

CAPACITIES—5 to 50 TONS

Patented grip prevents slipping, avoids damage, eases work in close quarters. Alloy steel — guaranteed.

OTC PULLING SYSTEM

Includes many sizes and types, Pushers and Pullers to install or remove gears, bearings, wheels, pulleys, sleeves, shafts, etc. Write for catalog.

SPECIAL PULLERS

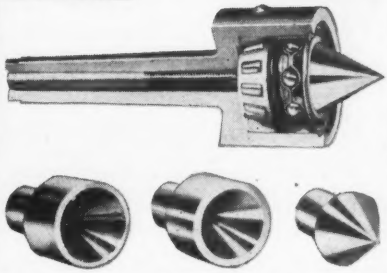
designed. Ask us about your special tool needs.



OWATONNA TOOL CO.

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IDEAL LIVE CENTERS



Interchangeable Inserts Permit Use With All Kinds of Centered and Uncentered Work

- Work with heavier loads at higher speeds!
- Save man-hours on centering work!
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- Make work easy—increase production!

IDEAL Live Centers are available with one or more of the following inserts—male insert, plain female insert, and female insert with raised lands.

Ideal Commutator Dresser Company
1031 Park Avenue Sycamore, Illinois



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THE "ORIGINAL" SWISS FILE MAKER

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss files. Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

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Ask also for catalog KM on Files for Filing Machines; catalog KR on Rotary Files and Diesinkers' Burs

GROBET FILE CORP. OF AMERICA
3 PARK PLACE NEW YORK CITY



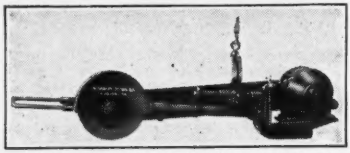
SAROSTON
Precision
Tool Room Grinder

Grinding wheels may be used on either end of spindle.

SIZES UP TO 2 H.P.

THE SAROSTON CO.
251 PARK ST., UPPER MONTCLAIR, N. J.

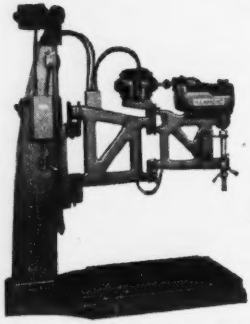
MUMMERT - DIXON
SWING FRAME GRINDERS



Sizes 12", 14", 16", 18", 20" and 24" wheels.
ASK FOR DESCRIPTIVE CIRCULAR
MUMMERT - DIXON CO.
120 Philadelphia St. • Hanover, Pa.

LOW COST DRILLING
with HAMMOND

The Hammond 4-ft. 6 speed Geared Head Radial for low cost drilling and tapping operations on holes up to 1" diameter. Spindle speeds 95, 190, 380, 570, 760 and 1140 R.P.M.



WRITE FOR CIRCULAR AND FULL PARTICULARS.

THE HAMMOND MFG. CO.
3089 E. 80th ST. CLEVELAND, OHIO

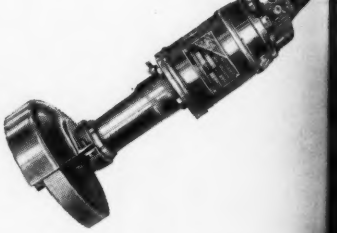
the hole by itself. The combinati the chamfer at the end and the an groove near the end permits easy of the gage, and the gage, accordi the manufacturer, centralizes lines up, and enters without jam Even when the plug is a very clos it is said to slide in without diffi

The P & W "Pilot" Cylindrical Gage is machine lapped for long g life and is available in several Large "Pilot" gages are claime work as easily as small ones.

Pratt & Whitney produces "P cylindrical plug gages under li from the originators in England. other American gage makers who to use this "Pilot" principle will to be licensed in turn by Pratt & W ney.

"Thor" Portable Air Grind

A complete line of "Thor" por air grinders based on the "Air Be the Blades" principle is announce the Independent Pneumatic Tool 600 W. Jackson Blvd., Chicago, Ill.

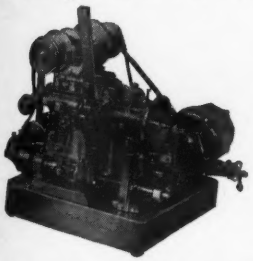


"Thor" No. 255 Portable Air Grin

"Air Behind the Blades" keeps the blades of the grinder out against cylinder wall, thus preventing "dead center" position or the d sion of the blades in the slots t oil accumulation. As a result, po starting is said to be assured und operating conditions.

The No. 255 grinder shown in t lustration is but one of the co Thor line which includes an unu complete range of 50 models and for every type of grinding from ging rough castings to finishing

"Waltham" Pinion Cutting Machines

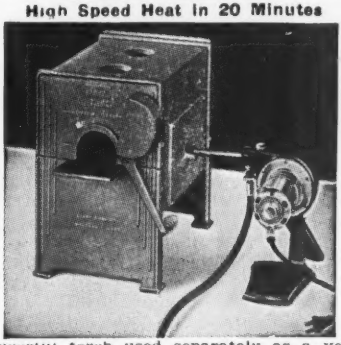


Are made with a variety of equipments. They will make the two or three successive cuts needed for watch pinions or may be used for fine pitch gears up to 1½" diameter. There is also a 4" size. If you will describe your work we will send details.

Waltham Machine Works
WALTHAM, MASS.

"Stark"

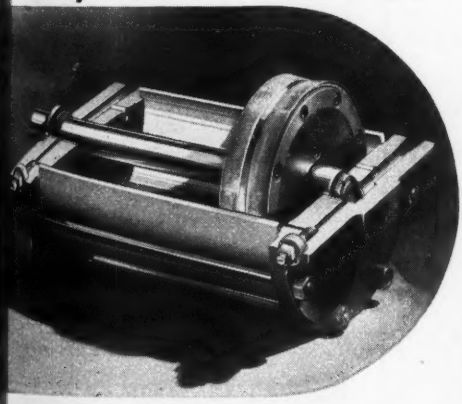
"ELECTROBLAST"
High Speed Heat in 20 Minutes



Powerful torch used separately as a very handy portable flame, $30. High Speed Muffle Furnace, no scaling or decarburization, reaches high speed heat in 20 minutes at 7c per hour; quickly saves its cost. Muffle 7"x 3⅛"x2⅛", $40. Also, with hydrogen atmosphere for the correct brazing of carbide-tip'd tools.

STARK TOOL CO.
Originators of the American Bench Lathe
Est. 1862 Waltham, Mass.

Adjustable "cushioned" air cylinder strokes



The action of the cushioned part of an air cylinder stroke depends on variables that are, at best, difficult to determine. This condition can be offset in part by having this cushion action adjustable. Cushion adjusting screws operate to "slow" or increase the speed of the cushion action.

Furnished as standard equipment on T-J Cushioned Air Cylinders, these screws may be readily *adjusted and locked in position on the job.* Write for catalog 36-A to the Tomkins-Johnson Co., 620 N. Mechanic St., Jackson, Michigan.

T-J CUSHIONED AIR CYLINDERS

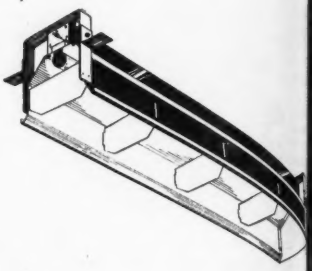
This is a **TOMKINS-JOHNSON** *product*

ion dies. There is a separate series of grinders for light, medium, heavy, and extra heavy types of production grinding as well as small wheel grinders for the shop, laboratory, or workbench. Thor grinders range in weight from 18 oz. to 24 lbs., in length from 5½ to 39 in., in speed from 3,000 to 21,000 r.p.m., and in capacity from 1½ to 8-in. diameter wheels.

Miller Fluorescent Troffer

Illustrated herewith is the Miller Fluorescent Troffer—a fluorescent lighting unit for the general illumination of offices, factories, drafting rooms, and similar locations—which has been announced by The Miller Company, Meriden, Conn. As a continuous trough or as an individual unit, the Miller Troffer is said to provide efficient illumination in areas heretofore considered extremely difficult to light and to allow the use of higher levels of illumination in general.

The Miller Fluorescent Troffer is comprised of four major parts; namely, the mounting support "U" strap assemblies, the wireway channel, the reflector (trough), and the baffles and end p
The reflector of the troffer is att
to the wireway channel by screw
cushioned washers after the chan
installed in the ceiling and all w
is completed. The reflector is



Miller Fluorescent Troffer

wide outside and is supplied in
lengths for 20-watt and 4-ft. length
40-watt fluorescent lamps. It is
structed of No. 22 gauge special c
eling steel, porcelain enameled with
gray ground coat outside and two

SAVAGE NIBBLING MACHINES

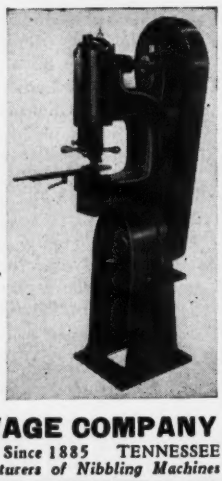
Powerful Direct-Over-Center Drive
Totally Enclosed Revolving Head

CAUTION!

Where excessive heat and open flame are dangerous, or injurious to the metal being cut, the Savage Nibbling Machine meets the requirement.

Capacities to 7/8".

Throat depths to 36".



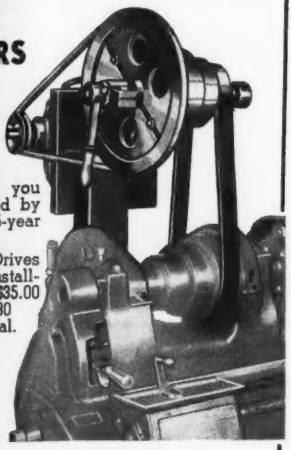
Ask for Bulletin "E" 1940

W. J. SAVAGE COMPANY
KNOXVILLE Since 1885 TENNESSEE
Pioneer Manufacturers of Nibbling Machines

GEARS
Good Gears On
All Kinds
Any Quantity
AT THE RIGHT PRICE
THE CINCINNATI GEAR
1825 Reading Road Cincinnati,

PRESSES
FEEDS
AUTOMATIC
EQUIPMENT
THE V & O Press Co.
HUDSON N Y

UARANTEED
FOR
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protected by
broad 5-year
arantee.
EEGE Drives
easily install-
—prices $35.00
-sent on 30
's' approval.

Let us
nd catalog.

L. STEEGE MACHINERY CO.
(Our 23rd Year)
W. MONROE ST. • CHICAGO, ILL.

BETTER FILING!
MORE ACCURATE
WEARS LONGER!



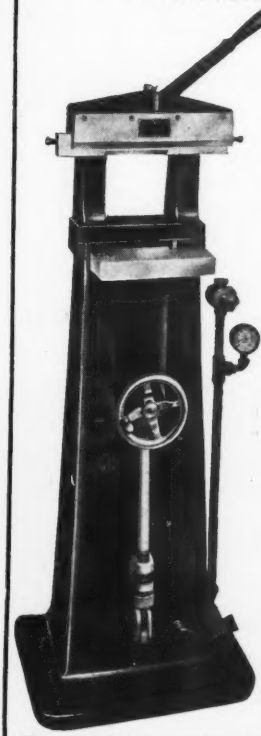
ALSO FOR SAWING AND STONING

undreds of shops, ILLINOIS Die Filing
hines are turning out accurate work many
s after their original purchase. Experi-
d diemakers who have operated various
e of filing machines know that an ILLINOIS
uality built throughout and will stand
onger, while producing more accurate
. Write for descriptive literature today.

ILLINOIS TOOL WORKS
N. Keeler Ave. Chicago, Illinois

LINOIS DIE FILING MACHINE

YOUR PRODUCTS
ALWAYS
IDENTIFIED
IF PERMANENTLY
MARKED
IN THIS MACHINE



MARKING BY ROLLING IS FAST AND ECONOMICAL

PRESERVES DIE LIFE AND PIECE PARTS REQUIRES ONLY FRACTION OF APPLIED PRESSURE AS COMPARED TO STAMPING.

—

QUICK SET-UPS

MODEL 25 HI-DUTY MARKING MACHINE

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.
1806 BELLE PLAINE AVE.
CHICAGO, ILLINOIS

of semi-gloss satin finish white porcelain enamel inside. The inner surface has a permanent reflection efficiency of 80 per cent minimum, and is durable and easy to clean. The reflector provides a shielding cut-off crosswise of the lamp of approximately 45 degrees.

The vertical baffles, which are of No. 22 gauge steel finished in baked satin finish white enamel and are spaced 12 in. apart in the reflector, provide a shielding cut-off lengthwise of the lamp of approximately 30 deg. and break up the continuous row effect. The middle three baffles of a 4-ft. section (one in middle of 2-ft. section) may be
and quickly removed for relam
Baffles at the ends of the reflecto
not removable. The end baffles
over the joint where two reflectors
forming a continuous trough. En
ends of a row of one or more refle
are enclosed by steel end plates fi
same as baffles.

The wireway channel is of N
gauge steel, finished inside and o
baked aluminum. It is supplied in
lengths; namely, 2-ft. lengths fo
taching one 24-in. reflector, 4-ft. le
for attaching one 48-in. reflector,
8-ft. lengths for attaching two
reflectors. Bolted to mounting su
straps, the channel forms a contin
rigid wireway in which all auxili
sockets, starter switches, compens
and service wires are firmly anch
completely independent of the refle
The channel is supplied complete
operating equipment and has a k
out for a ½ and ¾-in. conduit a
ment in the side. It is arrange
that all wiring can be done from
low. The reflector which fastens t
channel can be easily detached a
time to expose all operating equip
and wiring, thereby making ma
nance easy. The mounting support
strap assemblies to which the ch
is attached are available in four

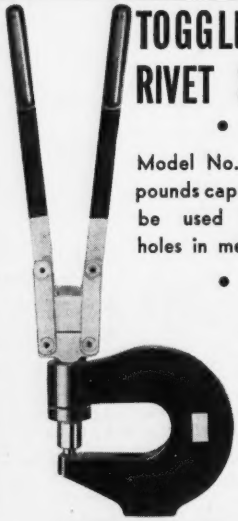
T. H. LEWTHWAITE MACHINE CO.

PUNCHES CUTTERS
BENDERS
SPECIAL TOOLS

PUNCHES and DIES for round, square and other shaped holes. Catalog sent on request.



317 EAST 47TH ST. • NEW YORK CITY
Wickersham 2-7164



TOGGLE ACTION RIVET SQUEEZER

• • •

Model No. 420 has 4000 pounds capacity. Can also be used for punching holes in metal.

• • •

Catalog shows this tool and also 28 models of Toggle Clamps, Pliers, Vises, etc.

Write for it today.

KNU-VISE INC.

16839 Hamilton Ave. Detroit, Mich.

"Ideal" Silent Commercial-T Cleaner

A silent commercial-type cleaner
able for heavy duty, all purpose c
ing has been announced by the
Commutator Dresser Co., 1031 Park
Sycamore, Ill. All fan and motor
has been eliminated in this cl
making it suitable for operation no

THE RIGHT WHEEL

When You Want It... Where You Want

Our entirely reconditioned
enables us to offer you an
proved product and service.

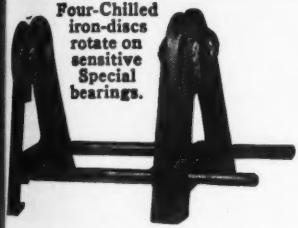
THE SAFETY GRIND
WHEEL & MACHINE

Est. 1889 Springfield,

Improved Anderson Balancing Ways Leveling required imple and ellent de- e for bal- c i n g, ightening d truing.

They are made in the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Four-Chilled iron-discs rotate on sensitive Special bearings.

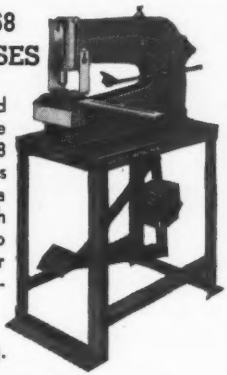
Write for Full Information

Anderson Bros. Mfg. Co.

6 Kishwaukee St. Rockford, Ill.

WHITNEY-JENSEN TOOLS

No. 58 and 68 FOOT PRESSES

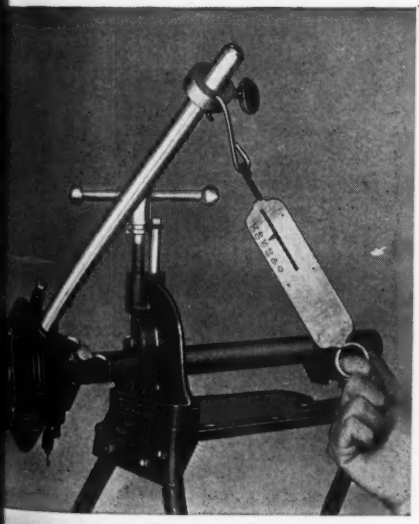


For speed and accuracy, use the Nos. 58 and 68 Foot Presses equipped with a special punch and die. Will help you solve your production problems.

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No. 58—12" THROAT DEPTH
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Whitney Metal Tool Co.
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THE FINEST OF 1" TO 2" THREADERS

A "TOLEDO" SIMPACT DOES PULL EASIER

This simple "torque-test" proves a "TOLEDO" SIMPACT requires less effort to operate.

Deep throated high speed steel dies that can be resharpened many times—and it requires but one set to thread all sizes from 1" to 2". Oil pockets drip oil on dies and pipe as thread is being cut. Handle is 24" long. Adjustable rear guide. Black crackle finish. Be assured of easy operation, long life and good threads —insist on a "TOLEDO" SIMPACT.

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Portable Surface Type Pyrometers and Instruments for Heat Treating

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Patented



Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly.

One of our models popular in tool rooms for 15 years.

Luma Electric Equipment Co.
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in the plant but also in the office salesroom.

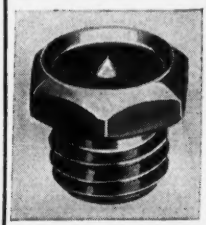
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Simply insert in work, invert, strike sharp blow. If you have centers already drilled circles perfectly located. Reduce time, eliminate spoilage of old methods. 7 sizes. Inexpensive — Last for years.

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LOOK AT THESE FEATURES

- No honing.
- Will not chatter.
- Chrome-like finish.
- Perfect alignment.
- Full bearing surface.
- Left and right spirals.
- 50 to 80 thousandths expansion
- Cannot fall in slots or oil grooves
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WORKERS WHO *Sweat* NEED *Salt*
USE MORTON'S SALT TABLETS •

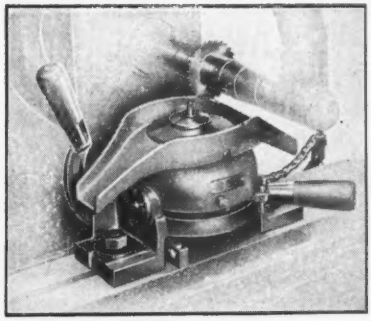
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We make all types of dressers and cutters



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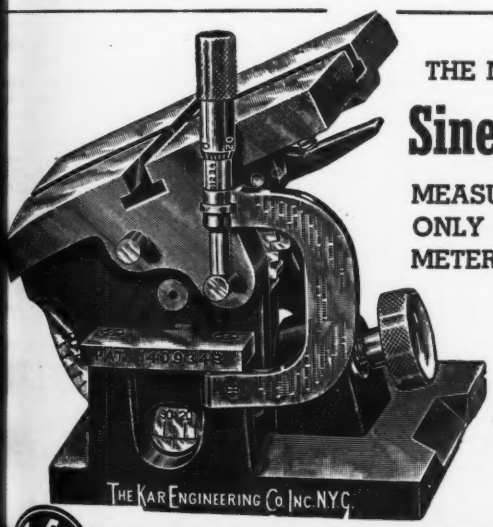
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MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

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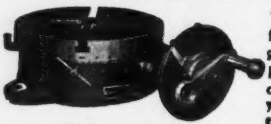
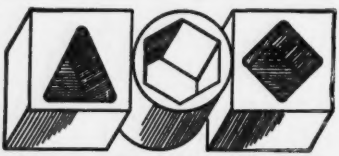


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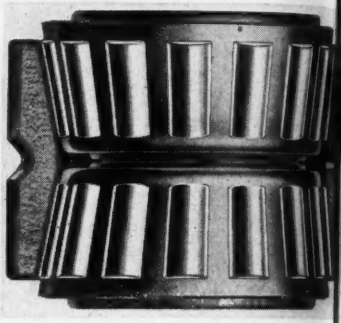


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Type, or non-adjustable, Timken R
Bearing. Made up of a double row
race or cup and two single row
races or cones, it is especially ad
to serve as a sheave bearing.

The races and rolls are ground
establish precision limits so that
the cones are assembled into the
the front faces of the cones contact
the proper running clearance is
vided. The front cone faces are al
and chamfered as shown to provid



**Timken Two-Row Double Cup NA Ty
Slotted Tapered Roller Bearing**

entrance for lubricant to within
bearing. This feature is said to
particularly advantageous in mul
sheave blocks where it is required
the bearings be lubricated through
pin, which is stationary.

The chamfered front faces of
cones, it is said, eliminate the ne
sity of machining a deep annular gr
around the shaft to carry the lubri
to the various points of entrance in
bearing. In some sheave blocks, l
cant may be introduced through a
ting in the sheave hub, and for
design an annular groove and holes
provided in the cup.

According to the manufacturer,
problem of sealing the bearing cha
has been greatly simplified by exte
the length of the large cone rib
creating a surface concentric with
shaft and sheave bore on which a
may be run. These seals have the
outside diameter as the cup and
pressed into the sheave bore, thus b
used to hold the bearing together
ing assembly. The back-face of
cones protrudes slightly outside
seal so as to establish clearance bet
the sheaves and frames of the b



This is how *you* and your *mechanics* will feel—after using DESSAU DIAMOND TOOLS!

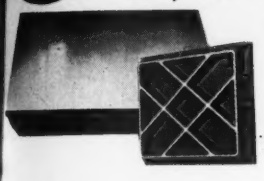
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Immediate shipment made on all diamond tools—reset tools returned to you the same day they are received by us.

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$15 Buys a *GOOD* Surface Plate

Why Let Your Men Waste Time With a Poor One?



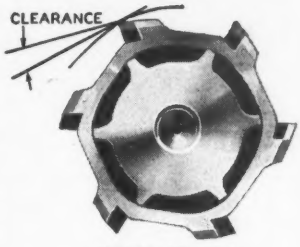
Here is a surface plate that has every feature you want for good layout work. Massive design and heavy ribbing to prevent warping. Surface precision ground to close limits. All edges machined square with each other and with the face. Wide ledges all around for clamping work, angle plates, vises, etc., impossible to do with improvised plates. Two sizes: 15" by 18" and 16" by 22", at $15.00 and $22.50. At these prices you cannot afford to be without good surface plates. Order from

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YOU CAN EXPAND THIS REAMER .0001" EASILY AND QUICKLY

Easy, rapid adjustment to .0001" is possible in a Staples reamer due to its patented tapered expansion plug. The range of expansion is from .004" in a ¼" dia. reamer to .020" in a 1½" dia. reamer. Due to construction, each expansion of the reamer further tilts the blades, presenting in effect, a new cutting edge. It is not unusual to find Staples type Carboloy-tipped reamers expanded several times without a regrind and without affecting the finish of the hole. This enables you to hold accurate sizes with a minimum servicing of the reamer. Sizes from ¼" dia. to 1½" dia. Write for leaflet. Sold through Carboloy Company or direct from . . .

STAPLES TOOL & ENGINEERING Co.
Cincinnati, Ohio



Carboloy Tips PATENTED.

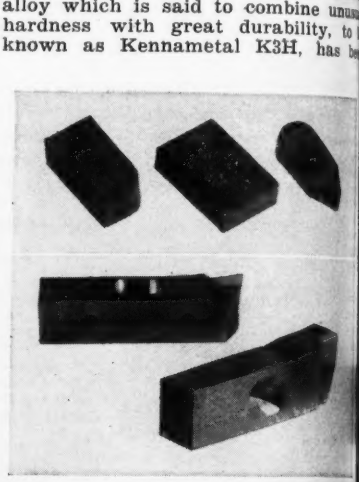
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The Timken Two-Row Double Cup NA Type Slotted Tapered Roller Bearing, it is stated, is designed to a minimum width and with an inside diameter large in relation to its outside diameter and also with a maximum radial and thrust capacity for the space occupied. Being an anti-friction thrust bearing as well as an anti-friction radial bearing, the sheaves can rotate freely without axial float. Wear between sheaves and side plates is said to be entirely eliminated. The tapered races of the two rows of rolls being directed one towards the other is claimed to result in a bearing of extreme rigidity, thus preventi wobbling of the sheave.

Kennametal K3H Tool Tip Material

A grade of tungsten-titanium carb alloy which is said to combine unusu hardness with great durability, to known as Kennametal K3H, has be



(Top) Three Standard Shapes of Kenna K3H Tool Tip Material. (Bottom) Ben Tools Tipped with Kennametal K3H Mat

announced by McKenna Metals Co., Lloyd Ave., Latrobe, Pa. Kennam K3H is recommended as a tool tip ma terial for light finishing cuts and fairly heavy continuous cuts on st of all hardnesses up to 550 Brinell. T tips of this material are supplied in three standard shapes shown at the of the illustration or in special shap

GERSTNER Tool Chests



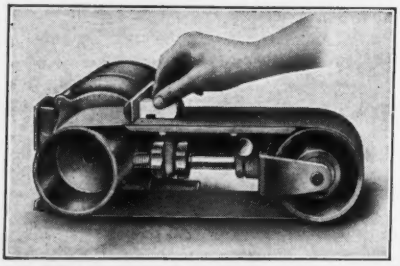
Modern in Design, Attractive Finish, Better Construction. A higher Quality chest at the right price. Machinists and Toolmakers may choose from Free Catalog.

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This No. 601 Bench Polisher comes complete with motor and cord ready to plug in your light socket. Abrasive belt, 4" x 35". 1/3 h.p.—1750 r.p.m. Pays for itself quickly by eliminating hand labor. Write for complete details.

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GREENFIELD MASS.

KENNAMETAL Cuts 3 Times Faster with 10 Times More Pieces per Grind

15 SECONDS MACHINING TIME



The valve tappets illustrated are made of S.A.E. 3140 and have a hardness of 23 Rockwell "C". Set KENNAMETAL machined 250 of these pieces per grind of tool, at 230 ft. per min. cutting speed (cobalt chrome alloy machined 25 pieces per grind of tool at 240 ft. per min.). A tungsten carbide tool used on this job did not stand up under the eccentric rough cutting, while the KENNAMETAL-tipped tool remained intact.

Bulletin 740, just published, explains in concrete terms why KENNAMETAL is the best tool material for machining steel of all hardnesses up to 550 Brinell. Write for your free copy **today.**

McKENNA METALS Co.
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30 DAY FREE TRIAL OFFER



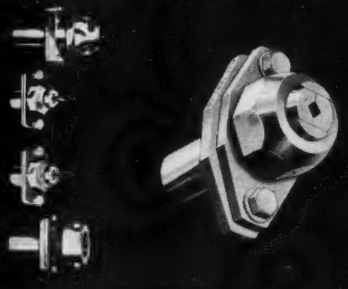
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Walton alloy steel "fingers", which fit the flutes of the tap, grip and back out the broken piece quickly, easily and without damage to threads.
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Stock sizes from No. 4 machine screws to 1¼", in 2, 3 or 4-flute types.

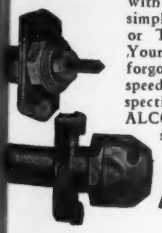
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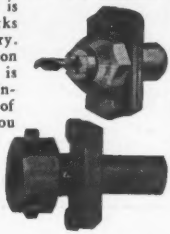


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Disregarding other outstanding advantages, built into ALCO Tools, the floating feature alone makes these tools the best buy for you as a screw machine user. Absolute concentricity can be had on even old machines with worn bearings in either turret or spindle, or both. Adjustment is simple, yet positive. *No bushings are required* with ALCO Drill Chucks or Tap Holders. Bushing headaches become merely a bad memory. Your bushing inventory is immediately wiped out—gone and soon forgotten. The quality of your output is improved. Production is speeded up. Expensive rejections are reduced to a minimum. Spot inspection only is necessary. We cannot tell you all the good points of ALCO Tools in this limited space, but if you'll write today, and you should for your own profit, we'll gladly elaborate. The Alco Tool Co., 835 Housatonick Ave., Bridgeport, Conn., U.S.A.

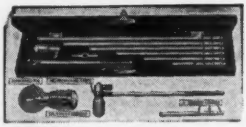


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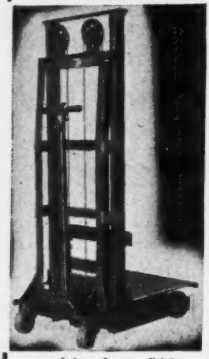
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This handy, full hydraulic lifting unit will serve a surprising number of needs in YOUR plant! Use it to transport heavy Dies—lift them into position on Production Machinery—raise skid platforms to bench or machine level—double-deck loaded skids—and many other time, labor, and MAN-saving Jobs.

Easy-operating, Weld-Bilt hydraulic mechanism is located *horizontally* beneath the platform. Can be stopped at any point at any speed by finger tip control at handle. Compact, requires little space to operate. Available in five standard sizes, with capacities from 500 to 2500 lbs.

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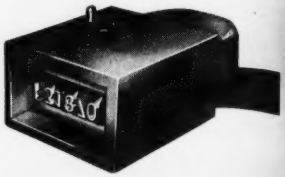
• *MATERIALS HANDLING ENGINEERS* •

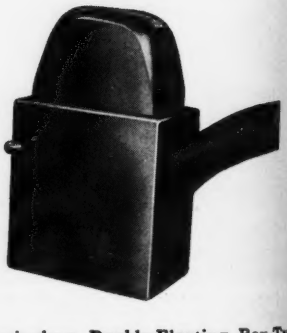
made to specification. Tools on wh tips have already been brazed are a furnished.

Kennametal K3H has a hardness 79.0 Rockwell C and a strength of 210 lbs. per sq. in. on the transverse ru ture test. The thermal conductivity 0.068 cal./sec./°c./cm. Because of t extreme hardness of the material, be ing tools tipped with Kennametal K such as shown at the bottom of the i lustration are said to produce from 2 to 225 pieces per grind of tool wh machining SAE 1020 forged and carbu ized steel.

Cunningham Double-Floating Box-Type Safety Holder

A double-floating box-type safety hol er designed for fast and efficient mari ing on hot, cold, flat, round, or angu lar surfaces is announced by the M. I





Cunningham Double-Floating Box-Type Safety Holder

Cunningham Co., 115-117 E. Carson St. Pittsburgh, Pa. The holder is said t work equally whether the surface t be marked is rough sheared, sawed, o ground.

The holder is constructed with a slee which levels or holds the "floating" typ



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Abuse Proof!

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Whole, natural diamonds of high quality and extreme toughness are spaced regularly throughout the matrix to give great accuracy, uniform dressings and to hold wheel to size. These stones are anchored permanently in their matrix by strong chemical bonds that will not break under heat, pressure or rough abuse. No remounting! Lowered costs! After tool is put in machine it will give best results if left in original position. It is not necessary to turn or alter the area in contact with the grinding wheel.

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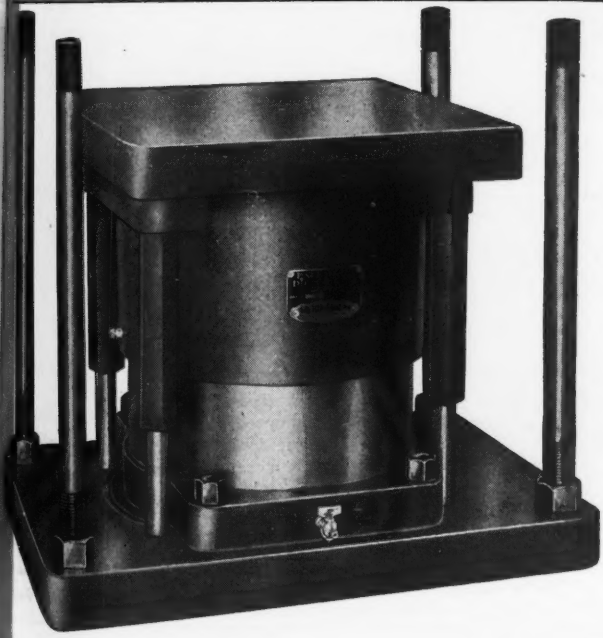
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CIRCLE "R" Saws are made in both high speed and carbon steel, from 1/4" to 10" diameter. Prompt delivery on all standard or special saws. Write for catalog.

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PNEUMATIC DIE CUSHIONS

Equip your presses for deep drawing work for as low as $50.00 complete.

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MINNEAPOLIS, MINN.

holder at right angles on the surface to be marked. The steel type also "floats" within the type holder. Due to the fact that both the holder and type are held loosely in place, a double leveling action takes place when the holder is struck with a hammer. The holder and type are made from a patented safety steel which is claimed not to spall or mushroom.

The leveling sleeve prevents the holder from tipping over when in use, and, at the same time, is said to prevent the pieces from flying out of the holder in case one of the stamps should brea chip off from misuse.

Union "Maxcut" and "Mul cut" Screw Steels

The Union Drawn Steel Division Republic Steel Corporation, Clevela Ohio, has announced a Bessemer sc steel and an open hearth screw s to be known as Union "Maxcut" "Multicut" respectively. Developed overcome deficiencies in fast machin steels formerly available, it is cla that bar after bar of Maxcut and Mu cut steels can be machined at high speeds with a resulting fine surface ish and without reduction in tool l

Produced through the combination modern chemistry and an advan process of manufacture, these steels is stated, are remarkably sound dense in structure, free from defe which cause internal seams and diffi ties that lead to rejection of finis parts and which shorten tool life as w as disrupt continuity of high speed m chining operations.

The uniform fast cutting Besse steel, Union Maxcut, has physical pro erties comparable to S.A.E. X 1112, a is said to machine equally as well better than the highest speed Besse steel previously available. Parts sh a smooth, fine finish when machined 280 surface feet per minute with a ha feed of 0.0095 in. and an average t life of more than 11 hours. The use lighter feeds permits much higher cu ting speeds. Union Maxcut responds cyaniding and other case hardening tr tures in a manner similar to S.A.E. X 1112.

Union Multicut, the fast cutting op hearth steel, has physical propert

PYRO RADIATION PYROMETER



STOP spoilage. Get exact temperature of work in furnace. Direct reading; no calculations; no maintainance expense. Strictly automatic. Range 1000-3600° F.

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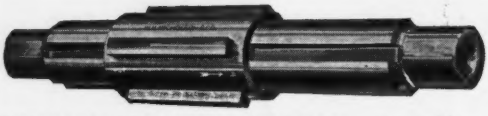
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Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet and Plate Shops.

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NICHOLSON EXPANDING MANDRELS — for holding any job with bores from ½" to 7" while being machined on lathes, grinders, or millers. Fourteen sizes—great time savers.

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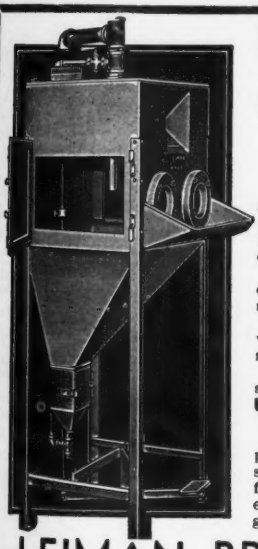
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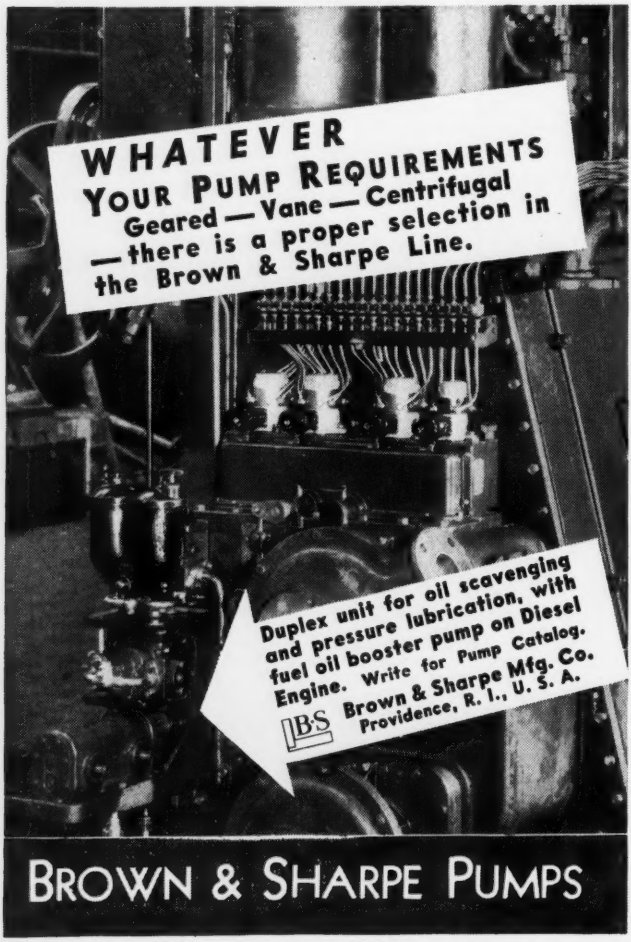
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"Tool Steel for the Non-Metallurgist"

Crucible Steel Company of America, 405 Lexington Ave., New York, N. Y., now has available for distribution reprints of the series of articles entitled "Tool Steel for the Non-Metallurgist" which was written by E. Replogle and published in the March, April, May and June, 1940, issues of MODERN MACHINE SHOP. A copy of the reprint will be sent without charge to any mechanical executive who will address a request on his company letterhead.

Hobart "Streamliner" Junior Gas Engine Driven Arc Welder is the subject of an illustrated and descriptive folder now being distributed by The Hobart Brothers Co., Troy, Ohio. Copy free.

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To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Metal Cutting Saws

Bulletin No. 51, just released by Peerless Machine Co., Racine, Wis., illustrates and describes Peerless Metal Cutting Saws.

2. Kennametal Tools and Blanks

A new bulletin issued by McKenna Metals Co., Latrobe, Pa., presents a fifteen-minute quiz on the nature and property of Kennametal, where it can be used, etc.

3. Universal Grinding Machines

New 20-page bulletin available from Cincinnati Grinders Incorporated, Cincinnati, Ohio, details and illustrates the line of Cincinnati Hydraulic Universal Grinding Machines.

4. 50 Years of Precision

Hardinge Brothers, Inc., Elmira, New York, in celebrating their golden anniversary, have issued bulletin titled, "50 Years of Precision." It details Hardinge Lathes and Milling Machines.

5. Carbide Tool Grinders

Bulletin No. 46101, featuring Ex-Cell-O Carbide Tool Grinders, has been issued by Ex-Cell-O Corporation, Detroit, Michigan.

6. Radiation Pyrometer

Pyro Radiation Pyrometer is presented in illustrated bulletin 100, Pyrometer Instrument Co., 101 Lafayette St., New York, N. Y.

7. Electric Hoists and Cranes

General catalog featuring the R & M line of Electric Hoists and Cranes has been issued by Robbins & Myers. Inc., Hoist & Crane Division, Springfield, Ohio.

8. Oilers

Gits Bros. Mfg. Co., 1845 S. Kilbo Ave., Chicago, Ill., has availa Bulletin No. 10 detailing sight g ity and wick feed oilers.

9. Hydraulic Cylinders

Bulletin No. 35-B, outlining and lustrating Hannifin Hydraulic C inders may be obtained from H nifin Mfg. Co., 621 S. Kolmar A Chicago, Ill.

10. Drilling and Tapping Machines

Bulletin No. 107, featuring Edl Nos. 2 M. S. and 4 M. S. Dril and Tapping Machines, is availa from Edlund Machinery Co., I Cortland, N. Y.

11. Geared Head Lathes

Bradford 12", 14", and 16" Gea Head Lathes are illustrated and scribed in new catalog issued The Bradford Machine Tool Co., C cinnati, Ohio.

12. Flexible Coolant Lines

Folder featuring flexible oil feed a coolant lines is available from Am ican Metal Hose Branch, T American Brass Co., Waterbu Connecticut.

13. Square Frame Arc Welder

Harnischfeger Corporation, Milwa kee, Wis., has just released descr tive folder featuring the new P& Hansen WD-150 square frame welder.

14. Diamond Dressing Tools

Literature and price list on Abras Red Band diamond dressing to may be obtained from Abras Dressing Tool Co., Detroit, M

Dust Control

79 installation photographs are presented in the Roto-Clone Dust Control book now available from American Air Filter Co., Inc., 702 Central Ave., Louisville, Kentucky.

Carbide Tool Grinder

Thomas Prosser & Son, 120 Wall St., New York, N. Y., has issued literature illustrating and describing the Prosser Carbide Tool Grinder.

Drill Grinder

Details of the Black Diamond drill grinder are outlined in Bulletin No. 121. Black Diamond Saw & Machine Works, Inc., 45 North Ave., Natick, Massachusetts.

Machine Tool Motor Drive

A complete line of transmissions for motorizing all types of machine tools is illustrated and described in bulletin released by Western Manufacturing Company, 3428 Scotten Ave., Detroit, Michigan,

Hoist Time Saving Calculator

A "Time Saving Calculator" that shows savings through use of Budgit Electric Hoists is available from Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 440 Broadway, Muskegon, Michigan.

20. Collet Chucks

A new bulletin featuring Universal Collet Chucks has been released by Universal Engineering Co., Frankenmuth, Michigan.

21. Sine Angle Plate

The Kar Engineering Company, Inc., 200 Hudson St., New York City, has available folder illustrating and describing the new and improved sine angle plate.

22. Stainless Steel Electrodes

Rezistal stainless steel electrode bulletin featuring a type for every stainless welding job has been issued by Crucible Steel Co. of America, 405 Lexington Ave., New York, New York.

23. Dividing Heads

The new line of L-W Dividing Heads is illustrated and described in new folder available from L-W Chuck Co., 20 N. St. Clair St., Toledo, Ohio.

24. Broaches and Fixtures

Detroit Broach Co., Inc., 6000 Beniteau Ave., Detroit, Mich., has issued a new 16-page booklet detailing Detroit broaches and broaching fixtures.

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Republic Stainless Steel Chart 381. Republic Steel Corporation, Cleveland, Ohio, has released a handy four-page, letterhead size folder or chart which contains a table listing the analyses and properties of 13 of the most popular types of Republic Enduro Stainless Steel. For comparison purposes, identical data for a carbon steel, S. A. E. 1020, is listed.

Designated as No. 381, the chart includes the American Iron & Steel Institute type numbers, approximate chemical compositions, physical properties, electrical properties, and mechanical properties. In addition, heat treatment is indicated, heat resistance is shown, and fabricating properties, including welding, machining, and drawing or stamping, are described. Copy of chart free upon request.



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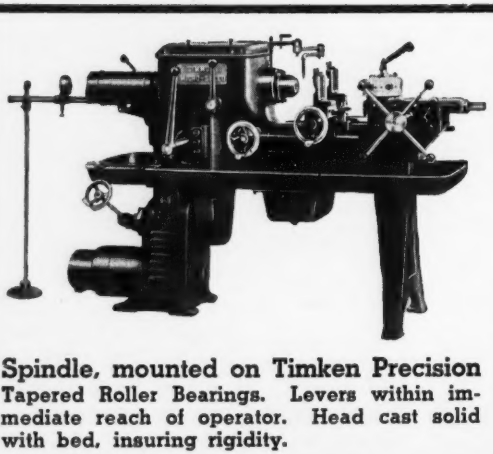
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New Literature

Hardinge Golden Anniversary Bulletin. Attractively printed in part with gold ink, with illustrations on the inside pages shellacked to give the appearance of actual photographs, the golden anniversary bulletin prepared by Hardinge Brothers, Inc., 1418 College Ave., Elmira, N. Y., presents clearly and in simple terms the Hardinge line of fully enclosed precision milling machines and lathes. Information showing the progress of Hardinge Brothers, Inc., during the past 50 years is given on the last page of the bulletin. Copy free to any mechanical executive upon request.

Sellstrom Eye Protectors Catalog No. 18. A 72-page catalog presenting the extensive range of modern protective equipment for eyes, head, and hands manufactured by the Sellstrom Mfg. Co., 65 N. Aberdeen St., Chicago, Ill., has been prepared for distribution by this firm. Designated as the No. 18, the catalog illustrates and describes various types of welding lenses, lens holders, welders' helmets, face shields, welders' hand shields, goggles, respirators, industrial gloves, and numerous other products. Copy free to any mechanical executive upon request.

Ohmite Industrial Catalog No. 40. A comprehensive 96-page industrial catalog and engineering manual incorporating helpful facts and information on the selection and application of resistors. Rheostats, tap switches, chokes, and attenuators has been prepared by the Ohmite Mfg. Co., 4835 Flournoy St., Chicago, Ill. The catalog contains a wealth of engineering data, handy reference tables, dimensional drawings, illustrations, special guide page, and manual resistance measurements, all clearly defined and arranged so as to make it easy to select proper stock units or to plan special made-to-order units for any application.

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"Logan" Shell Holding Equip Bulletin. Logansport Machine Incor rated, 901 Payson Rd., Logansport, I is now issuing a bulletin on "Log Air and Hydraulic Operated Shell H ing Equipment. This 20-page bull is complete with line drawings of ac holding equipment and recomme tions for both air and hydraulic a iary operating equipment. Copy upon request.